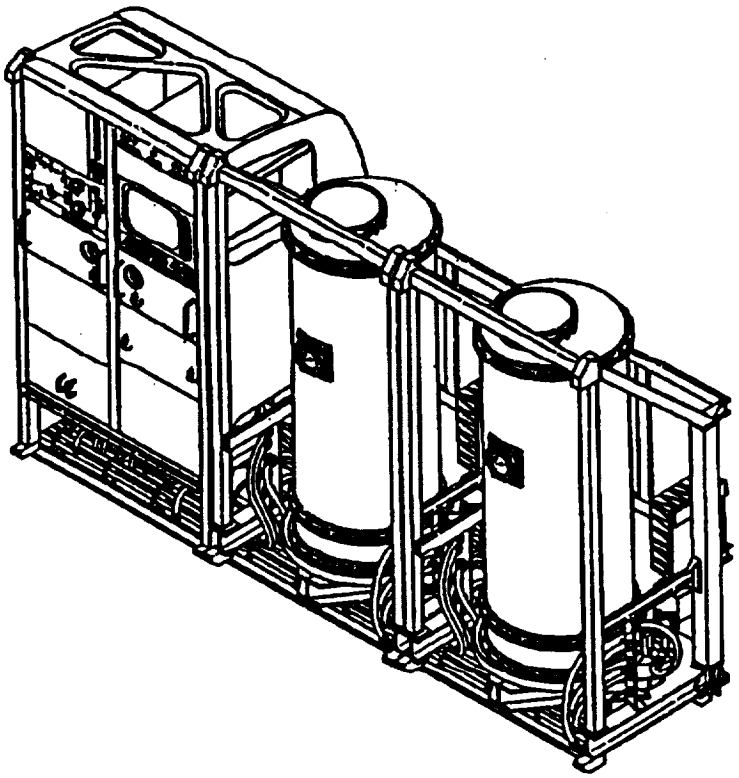
SPACE STATION FURNACE FACILITY
Experiment/Facility Requirements Document (E/FRD)



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EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

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EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

SECTION 1: INTEGRATED CONFIGURATION-1

MAY 1992

FOREWORD

The Space Station Furnace Facility (SSFF) is designed to accommodate and support a variety of furnace modules throughout the operational lifetime of the facility. Since the SSFF will be operational for 30 years, and various furnace modules will be accommodated, the Experiment/Facility Requirements Document (E/FRD) is divided into two separate sections. Section 1 describes the integrated SSFF-to-SSF interface, which includes the SSFF Core subsystem requirements and the furnace module requirements based on the information obtained from the Furnace Developer's Section 2, and Section 2 describes the furnace module-to-SSFF interface. Multiple Section 2s may be required for each E/FRD, depending on how many furnace modules the SSFF will accommodate per mission, since a separate Section 2 will be written for each furnace module. Both sections will be replaced for each mission with the appropriate mission-peculiar furnace module interface requirements since the Core configuration is a function of the furnace module(s).

This E/FRD reflects the Initial Configuration-1 (IC1), which is the initial integration of the SSFF Core and Furnace Module-1 into the SSF U. S. Laboratory Module-A. IC1 is planned for 1997, based on the assumption that Utilization Flight 3 (UF-3) is the carrier. Furnace Module-1 is scheduled to be an upgrade of the present Crystal Growth Furnace (CGF), and Section 2 reflects the requirements of that module.

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ACRONYM LIST

AA	Avionics Air
CCF	Centralized Core Function
CCOS	Centralized Core Operating System
CCU	Core Control Unit
CdTe	Cadmium Telluride
CGF	Crystal Growth Furnace
cm	Centimeter
CMCU	Core Monitor and Control Unit
CP	Coldplate
CPC	Core Power Conditioners
CPCS	Core Power Conditioners Stimulus
CRW	Crew
CSF	Core-Specific Function
DC	Direct Current
DCF	Distributed Core Function
DCMU	Distributed Core Monitoring Unit
DCOS	Distributed Core Operating System
dia	Diameter
DMS	Data Management System (SSF) Data Management Subsystem (SSFF)
DR	Data Requirement
E/FRD	Experiment/Facility Requirements Document
EAC	Experiment Apparatus Container
EPS	Electrical Power System
ESF	Experiment-Specific Function
Ess	Essential
FAU	Furnace Actuator Unit
FCU	Furnace Control Unit
FDACS	Furnace Data Acquisition and Control System
FDDI	Fiber Distributed Data Interface
FDIR	Fault Detection, Isolation, and Recovery
FDS	Fire Detection and Suppression
FM-1	Furnace Module-1
FO	Functional Objective
ft	Foot

ACRONYM LIST (Cont.)

ft^2	Square foot
FTM	Furnace Translation Mechanism
g	Gravity
GaAs	Gallium Arsenide
GDS	Gas Distribution Subsystem
GHE	Gaseous Helium
GN_2	Gaseous Nitrogen
GND	Ground
GSE	Ground Support Equipment
H/W	Hardware
H_2O	Water
HDR	High-Density Recorder
HgZnTe	Mercury Zinc Telluride
HRDL	High-Rate Data Link
h	Hour
HX	Heat Exchanger
Hz	Hertz
IC1	Integrated Configuration-1
IROP	Integrated Requirements on Payloads
IFEA	Integrated Furnace Enclosure Apparatus
ISPR	International Standard Payload Rack
ISS	Internal Support Structure
JSC	Johnson Space Center
kg	Kilogram
KSC	Kennedy Space Center
kW	Kilowatt
kWh	Kilowatthour
LAN	Local Area Network
lbm	Pound Mass
LNS	Liquid Nitrogen System
MBPS	Megabytes per Second
MDM	Multiplexer/Demultiplexer
mm	Millimeter
MPAC	Multipurpose Application Console

ACRONYM LIST (Cont.)

MPLM	Mini-Pressurized Logistics Module
MSFC	Marshall Space Flight Center
MSS	Mechanical Structures Subsystem
NASA	National Aeronautics and Space Administration
NTSC	National Television Standard Committee
OMIS	Operations Management Information System
ORU	Orbital Replacement Unit
PAM	Payload Accommodations Manager
PCDS	Power Conditioning and Distribution Subsystem
PED	Payload Element Developer
PES	Payload Executive Software
PI	Payload Investigator
PIC	Payload Integration Center
PIM	Payload Increment Manager
PLM	Pressurized Logistics Module
POIC	Payload Operations Integration Center
ppm	Parts per Million
psia	Pounds per Square Inch Absolute
PTRD	Payload Training Requirements Document
QD	Quick Disconnect
RFM	Reconfigurable Furnace Module
RPC	Remote Power Controller
RPCM	Remote Power Controller Module
RPDA	Remote Power Distribution Assembly
S/W	Software
SACA	Sample Ampoule/Cartridge Assembly
sec	Second
SEM	Sample Exchange Mechanism
SIP	Sample Insertion Port
SS	Subsystem
SSF	Space Station Freedom
SSFF	Space Station Furnace Facility
STS	Space Transportation System
SW	Software

ACRONYM LIST (Conc.)

TAT	Training Assessment Team
TBD	To Be Determined
TCS	Thermal Control System (SSF) Thermal Control Subsystem (SSFF)
UF-3	Utilization Flight 3
UPTP	User Payload Training Plan
USL	United States Laboratory
V	Volt
Vdc	Volts Direct Current
VES	Vacuum Exhaust System
W	Watt
µm	Micrometer
MΩ	Megohm

1.1. FUNCTIONAL OBJECTIVES AND EQUIPMENT IDENTIFICATION

1.1.1 SYSTEM DESCRIPTION

The function of the Space Station Furnace Facility (SSFF) is to support materials research into the crystal growth and solidification processes of electronic and photonic materials, metals and alloys, and glasses and ceramics. To support this broad base of research requirements, the SSFF will employ a variety of furnace modules operated, regulated, and supported by a core of common subsystems. Furnace modules may be reconfigured or specifically developed to provide unique solidification conditions for each set of experiments. The SSFF modular approach permits the addition of new or scaled-up furnace modules to support the evolution of the facility as new science requirements are identified. The SSFF Core is of modular design to permit augmentation for enhanced capabilities.

The fully integrated configuration of the SSFF will consist of three racks with the capability of supporting up to two furnace modules per rack. The initial configuration of the SSFF will consist of two of the three racks and one furnace module. This Experiment/Facility Requirements Document (E/FRD) describes the integrated facility requirements for the Space Station Freedom (SSF) Integrated Configuration-1 (IC1) mission. The IC1 SSFF will consist of two racks: the Core Rack, with the centralized subsystem equipment, and the Experiment Rack-1, with Furnace Module-1 and the distributed subsystem equipment to support the furnace.

The IC1 SSFF configuration is shown in Figure 1.1-1. It consists of two double rack replacement structures, the centralized and distributed components to support furnace operations, and Furnace Module-1. The SSFF support functions are provided by the following Core subsystems:

- Power Conditioning and Distribution Subsystem (SSFF PCDS)
- Data Management Subsystem (SSFF DMS)
- Thermal Control Subsystem (SSFF TCS)
- Gas Distribution Subsystem (SSFF GDS)
- Mechanical Structures Subsystem (SSFF MSS)

1.1.2 FUNCTIONAL OBJECTIVES

There are 13 functional objectives (FOs) for the SSFF which are structured as one FO for payload checkout: one FO for Core activation; one FO for the distributed equipment activation; eight FOs for experiment sample operations, calibration/bakeout, and vent and purge cycles; one FO for furnace sample loading or shutdown; and one FO for SSFF shutdown. The actual FO numbering is as follows:

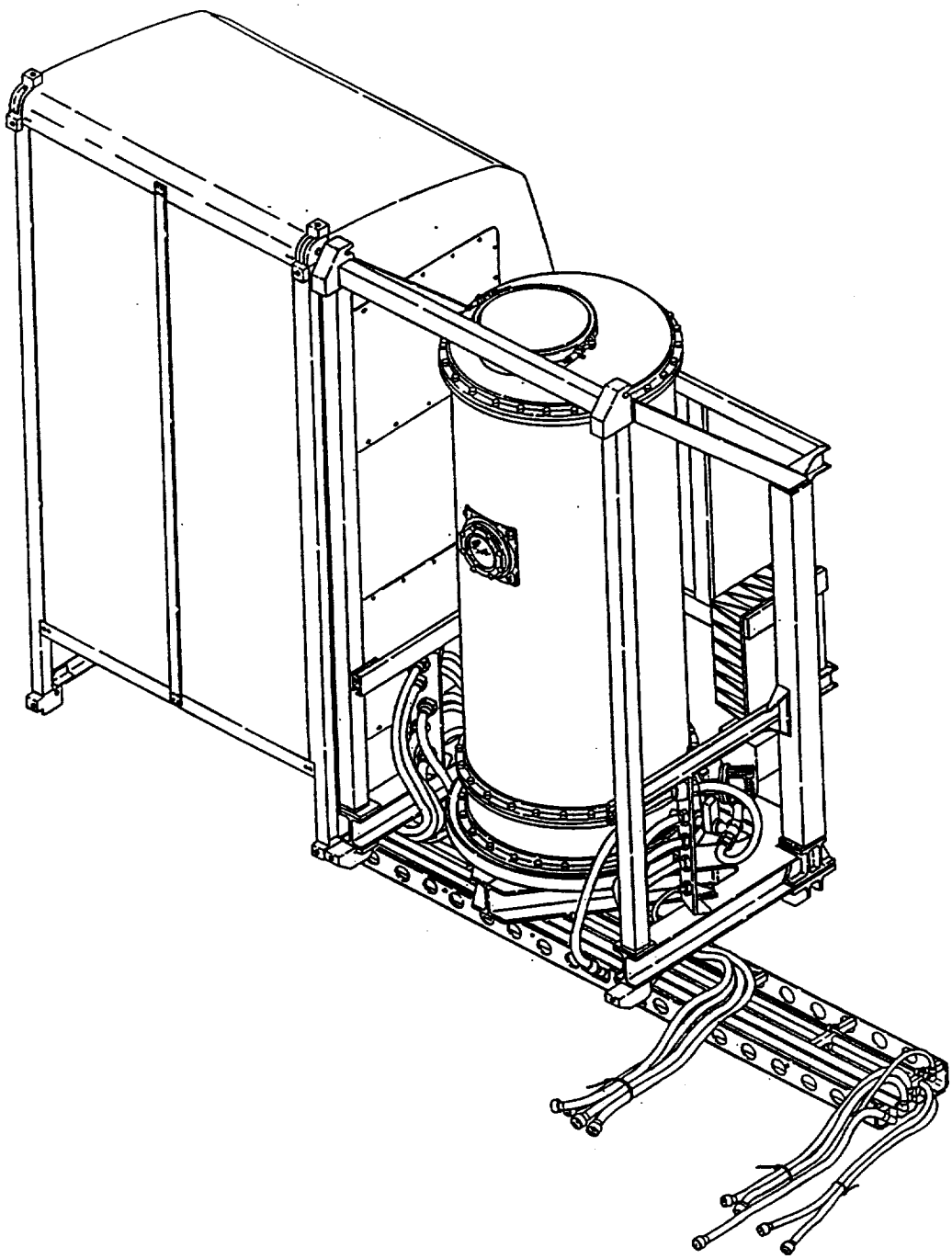


FIGURE 1.1-1. SSFF IC1 CONFIGURATION

FO-0 Payload Checkout
FO-1 Core Activation
FO-2 Distributed Equipment Activation
FO-3 Furnace Module-1 Sample Exchange
FO-4 Furnace Module-1 Vent/Purge
FO-5 Furnace Module-1 Process Sample HgCdTe
FO-6 Furnace Module-1 Process Sample HgZnTe
FO-6A Furnace Module-1 Process Sample Extended HgZnTe
FO-7 Furnace Module-1 Process Sample CdTe
FO-8 Furnace Module-1 Process Sample GaAs
FO-9 Configure Furnace Module-1 for Sample Loading or Shutdown
FO-10 SSFF Shutdown
FO-11 Furnace Module-1 Process Calibration/Bakeout

Table 1.1-1 shows a listing of the SSFF FOs along with the equipment associated with each step of each FO. Step duration, crew time requirements, and average power requirements for each step of each FO are defined in Table 1.1-2, Functional Objective Requirements Sheets.

1.1.3 EQUIPMENT IDENTIFICATION

The SSFF will occupy two double rack locations in the U. S. Laboratory (USL) for IC1. The Core Rack, modified [relative to the International Standard Payload Rack (ISPR)] to permit interconnections to the adjacent experiment rack, will provide mechanical/structural interface for the centralized SSFF subsystem components. Experiment Rack-1 will provide mechanical/structural interface for distributed SSFF subsystem equipment required to support the furnace operation, and Furnace Module-1. Figures 1.1-2 through 1.1-5 show the SSFF centralized and distributed equipment to the Orbital Replacement Unit (ORU) level per subsystem. Figure 1.1-6 shows the Furnace Module-1 equipment. A block diagram of the SSFF is shown in Figure 1.1-7, which identifies and shows the interrelationship of each item of SSFF equipment and the interfaces with SSF and the furnace module.

1.1.4 OPERATIONAL FUNCTIONAL FLOWS

Preliminary functional flows are shown in Table 1.1-3 for each FO. Functional flows define the function performed, the performing element, and decisions involved in accomplishing each FO.

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 1 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 1	CCU and CMCU Activation	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 2	SSFF to Ground Link	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 3	Test CMCU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 4	Configure and Test TCS in Core Rack	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 2 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 5	Test CPC	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Core Power Conditioners
FO-1 Step 6	GDS Test	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Latching Solonoid Valves Contamination Monitor
FO-1 Step 7	Activate Camera and Videolink	NOT USED IN IC1
FO-1 Step 8	Core Readiness Check	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 3 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 8 (Cont.)	Core Readiness Check	Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-2 Step 1	CCU Powers RPCM/DCMU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit
FO-2 Step 2	CCU Powers FCU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit
FO-2 Step 3	FCU Checkout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 4 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 3 (Cont.)	FCU Checkout	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit
FO-2 Step 4	FAU Powered	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-2 Step 5	FAU Checkout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 5 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 6	Configure and Test TCS in Furnace Rack	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducer Video Processor Unit Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-2 Step 7	GDS Test	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 6 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 8	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 1	Command Manual Sample Exchange	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 7 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 2	Vent/Fill Furnace Module-1	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 3	Equalize Furnace Module-1 Pressure	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Manual Valve
FO-3 Step 4	Prep Equipment	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 8 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 4 (Cont.)	Prep Equipment	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 5	Open SIP	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 6	Insert Samples	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 9 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 7	Close SIP	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 8	Open Valves	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Manual Valves
FO-3 Step 9	Command Manual Sample Exchange Off	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 10 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 9 (Cont.)	Command Manual Sample Exchange Off	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 10	Perform Seal Check	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 1	GN_2 Purge Furnace	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 11 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-4 Step 2	Argon Backfill	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 3	Command Sample Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 4	TCS Configured	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 12 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-4 Step 3 (Cont.)	TCS Configured	Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-5	Vapor Crystal Growth of HgCdTe	All equipment listed below
FO-6	Meltback and Regrowth of HgZnTe	All equipment listed below
FO-6a	Meltback and Regrowth of HgZnTe	All equipment listed below
FO-7	Growth of CdTe by Dir. Solidification	All equipment listed below
FO-8	Growth of GaAs by Dir. Solidification	All equipment listed below Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 13 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-9 Step 1	Verify Furnace in HOME Position	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-9 Step 2	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Video Processor Unit Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-9 Step 3	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 14 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-9 Step 3 (Cont.)	Furnace-Specific Tests	RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-10 Step 1	Distributed Equipment Shutdown	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 2	Verify Experiment Shutdown	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 15 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-10 Step 3	Shut Down GDS Subsystems	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 4	DMS Nonessentials Shutdown	Core Control Unit Core Monitor Control Unit RPCM Essentials Power Supply Voltage and Current Sensors Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 5	TCS Shutdown	Core Control Unit Core Monitor Control Unit Essentials Power Supply Voltage and Current Sensors
FO-10 Step 6	CCU Shutdown	

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 16 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-11 Step 1	Activate Calibration/Bakeout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-11 Step 2	Initiate Calibration Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-11 Step 3	Bakeout Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 17 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-11 Step 3 (Cont.)	Bakeout Process	Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 1 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Payload Activation
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 0
PREREQUISITE:_____
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	5:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0.00	0.00	0.00			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Open TCS manual valves
2	Open GDS manual valves
3	Verify Station services activated at rack

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 2 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 1
FO NAME: Core Activation
PREREQUISITE: FQ-0
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	5:00	2:00	1:00	4:00	3:00	7:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.008	1.008	1.008	1.1479	1.4637	1.2926
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate CCU and CMCU
2	SSF to ground initial link
3	Test CMCU
4	Configure and test TCS in Core
5	Test CPC
6	GDS tests in Core

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 3 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Core Activation
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 1
PREREQUISITE: FO-0
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	5:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.1479	1.1479				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Activate camera and test videolink and high rate link (not used during MTC)
8	Core readiness check

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 4 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 2
FO NAME: Distributed Equipment
PREREQUISITE: FO-1
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE:
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	2:00	2:00	2:00	2:00	5:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.3220	1.7620	1.7620	2.0988	2.0988	2.1136
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	CCU activates RPCM
2	CCU activates FCU
3	FCU checkout
4	FAU activation
5	FAU checkout
6	CCU configuration of TCS

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 5 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Distributed Equipment
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 2
PREREQUISITE: FO-1
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	:17	12:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1835	2.1336				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Checkout GDS components
8	Furnace specific tests

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 6 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 3
FO NAME: Manual Sample Exchange
PREREQUISITE: FQ-2
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE:
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	32:00	10:00	10:00	7:00	20:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1		1	1	1	1
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1487	2.1336	2.1336	2.1336	2.1336
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Command "Manual Sample Exchange" on
2	Vent/fill furnace module
3	Equalize furnace module pressure
4	Prep equipment
5	Open SIP
6	Insert samples

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 7 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 3
FO NAME: Manual Sample Exchange
PREREQUISITE: FO-2
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE:_____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH:_____

STEP NUMBER		7	8	9	10	11	
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	3:00	1:00	65:00	4:00	
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1	1	1	1	1	
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1336	2.1336	2.1338	2.1336	
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Close SIP
8	Open valves
9	Command "Manual Sample Exchange" off
10	Perform seal check
11	Load list process

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 8 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 4
FO NAME: Purge Furnace Module
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	32:00	10:00	2:00	2:00		
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1487	2.1487	2.1336	2.1639		
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	GN2 purge furnace
2	Argon backfill
3	Command sample process
4	TCS configured

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 9 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Vapor Crystal Growth of HgCdTe
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 5
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	188:00	60:00	480:00	240:00	21:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	3.2496	2.5996	2.5996	2.2536	2.536
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Activate and process heat cycle
3	Anneal sample
4	Initiate vapor crystal growth processing
5	Cool sample and extract
6	Cool and stow

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 10 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 6
FO NAME: Meltback and Regrowth of HgZnTe
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE:_____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	7390:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.7316	2.6496	2.6496	2.6496	2.6496
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 11 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback & Regrowth of HgZnTe
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 6
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.3246	2.1946				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 12 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 6A
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE:_____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	59957:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.7316	2.6496	2.6496	2.6496	2.6496
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 13 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 6A
PREREQUISITE: FO-3
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.3246	2.1946				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Internally stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 14 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 7
FO NAME: Growth of CdTe by Directional Solidification
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	538:00	120:00	4278:00	438:00	208:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	3.4786	3.3746	3.2996	2.7244	2.3746
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module for processing
2	Process heat cycle
3	Soak
4	Process sample, directional solidification
5	Cool sample to 400 °C
6	Cool sample to 200 °C and internally stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 15 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Growth of GaAs by Directional Solidification
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 8
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	45:00	227:00	68:00	720:00	210:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.9916	4.4866	3.4776	3.3926	2.8016
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module processing
2	Preheat cycle
3	Process heat cycle
4	Soak
5	Translate furnace/process sample
6	Cool down to 800 °C

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 16 of 19)

EXPERMENT NAME: Space Station Furnce Facility
FO NUMBER: 8
FO NAME: Growth of GaAs by Directional Solidification
PREREQUISITE: FQ-3
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE:
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH:

STEP NUMBER		7					
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	466:00					
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536					
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool down to 200 °C and internally stow

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 17 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Configure Furnace for Shutdown/Sample Loading
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 9
PREREQUISITE:_____
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1336	2.1336			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Verify furnace is in home position
2	Furnace specific tests
3	CCU secures power from furnace module

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 18 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 10
FO NAME: SSFF Shutdown
PREREQUISITE: FQ-9
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	3:00	5:00	1:00	1:00	1:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.1479	1.1479	1.1479	0.5612	0.3102	0.00
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Distributed Core Eq. shutdown
2	Verify experiment/furnace shutdown
3	GDS shutdown
4	DMS nonessential shutdown
5	TCS shutdown
6	CCU shutdown

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 19 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Furnace Calibration/Bakeout
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 11
PREREQUISITE: FO-3
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	TBD	480:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	TBD	TBD			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate calibration/bakeout
2	Initiate calibration
3	Bakeout/calibration process

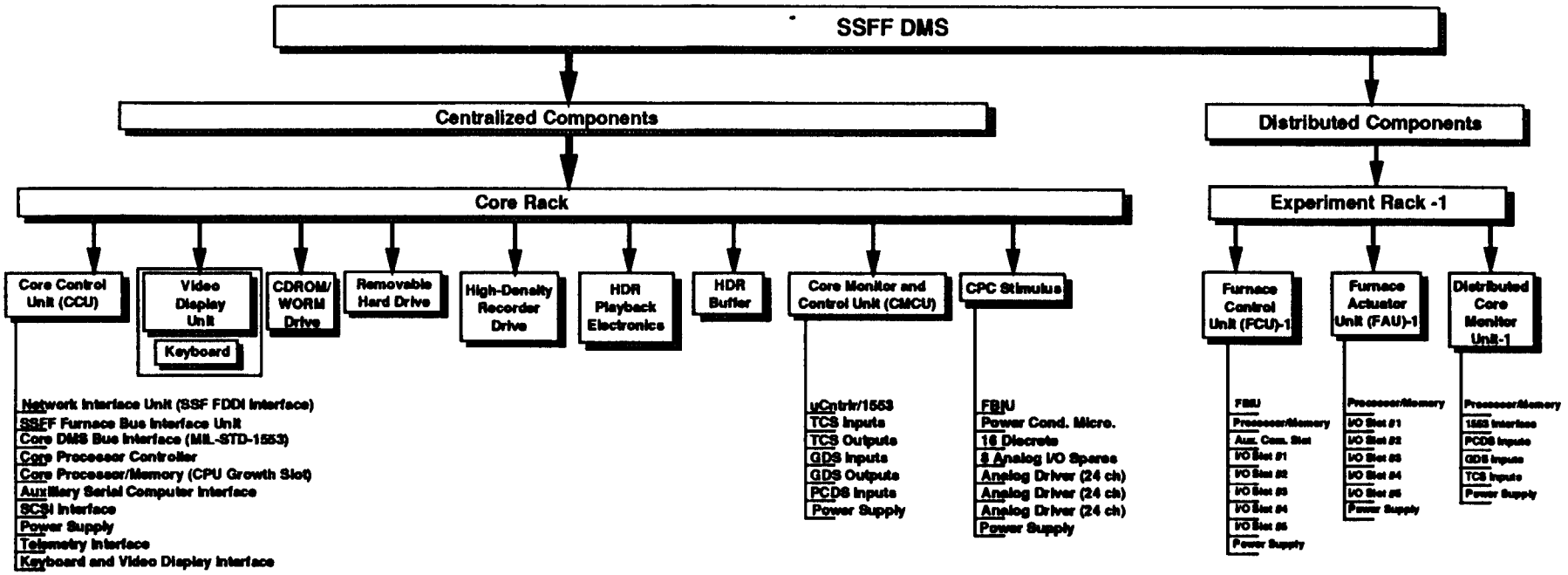


FIGURE 1.1-2. DMS COMPONENT TREE

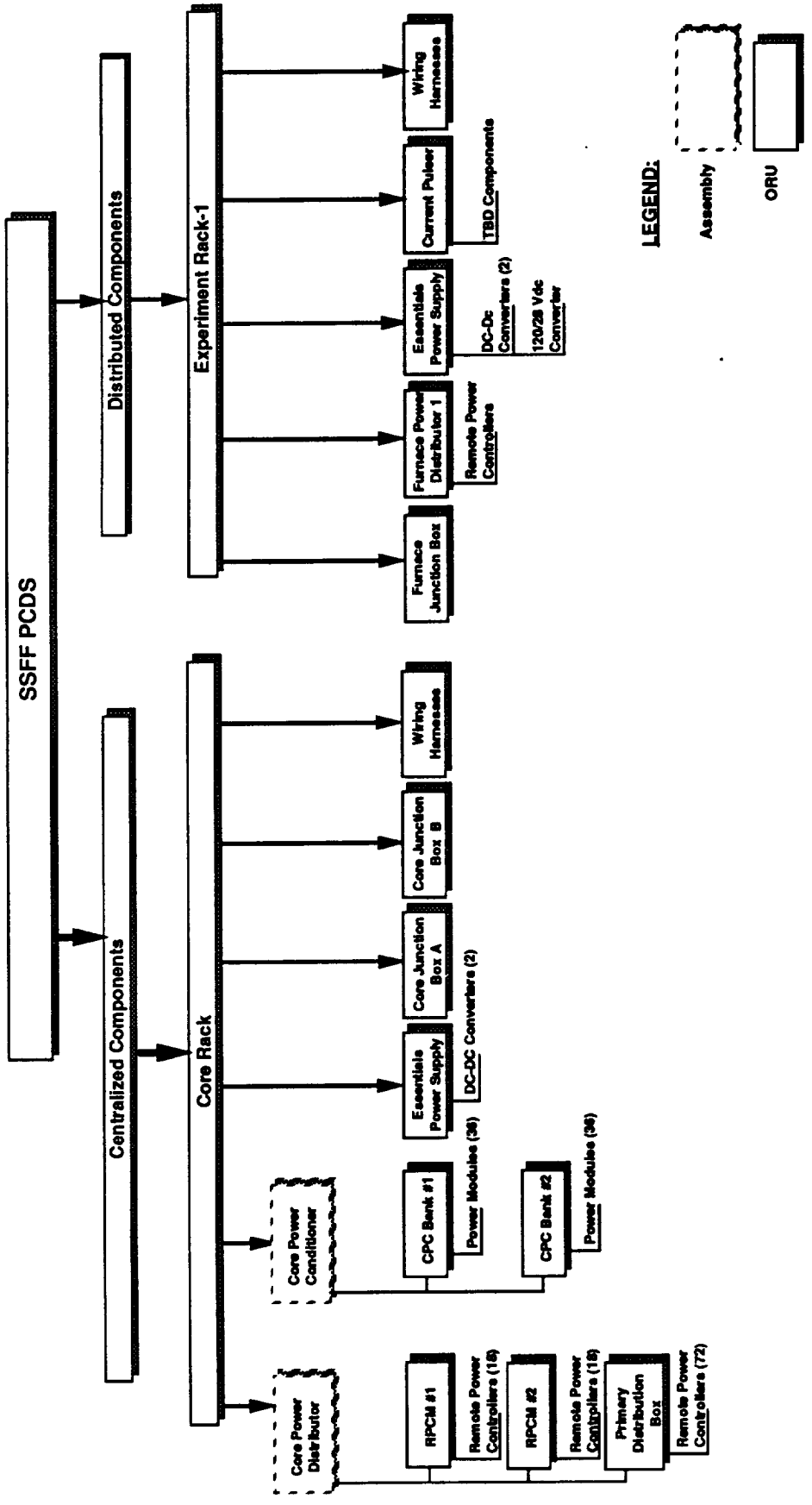


FIGURE 1.1-3. PCDS COMPONENT TREE

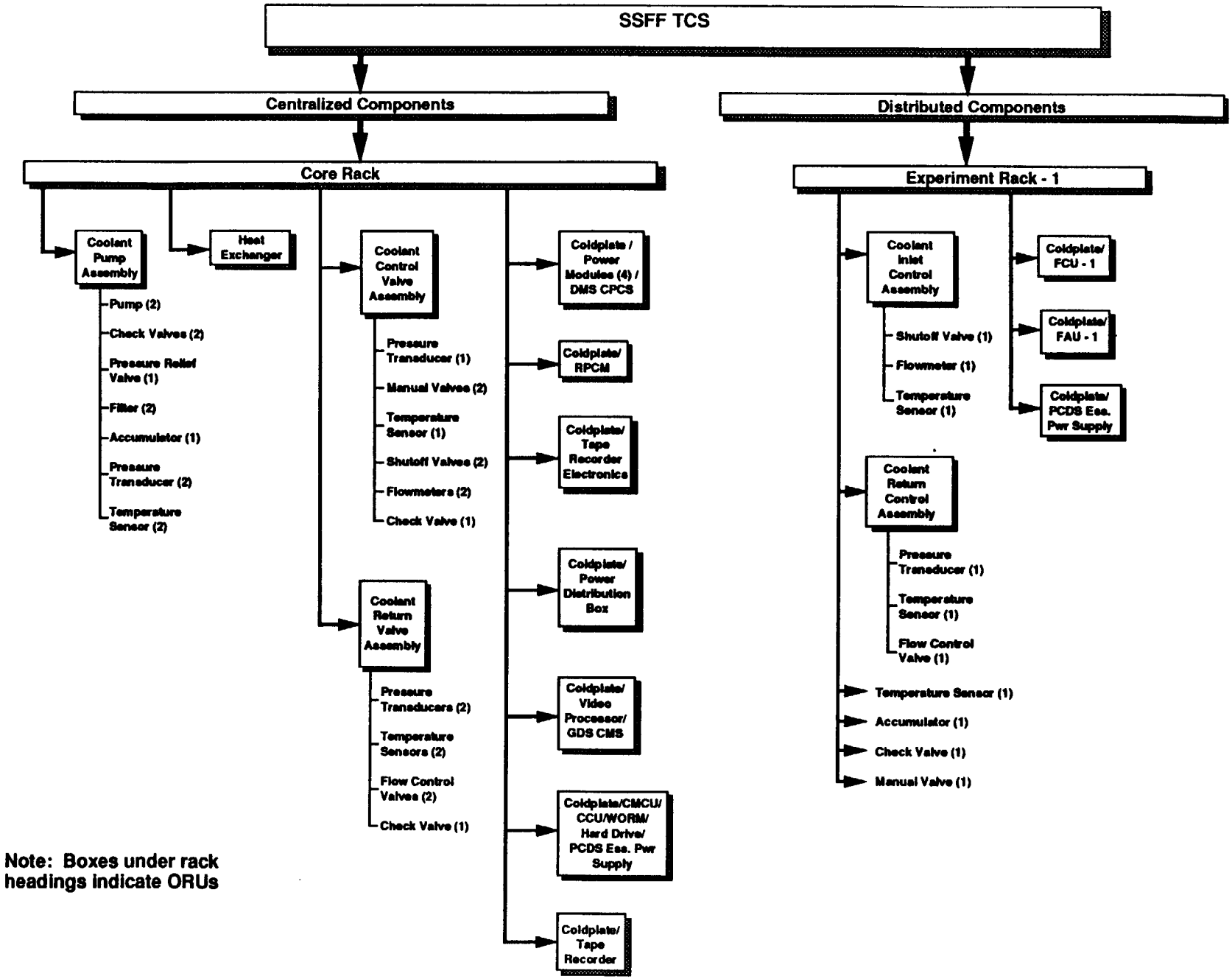


FIGURE 1.1-4. TCS COMPONENT TREE

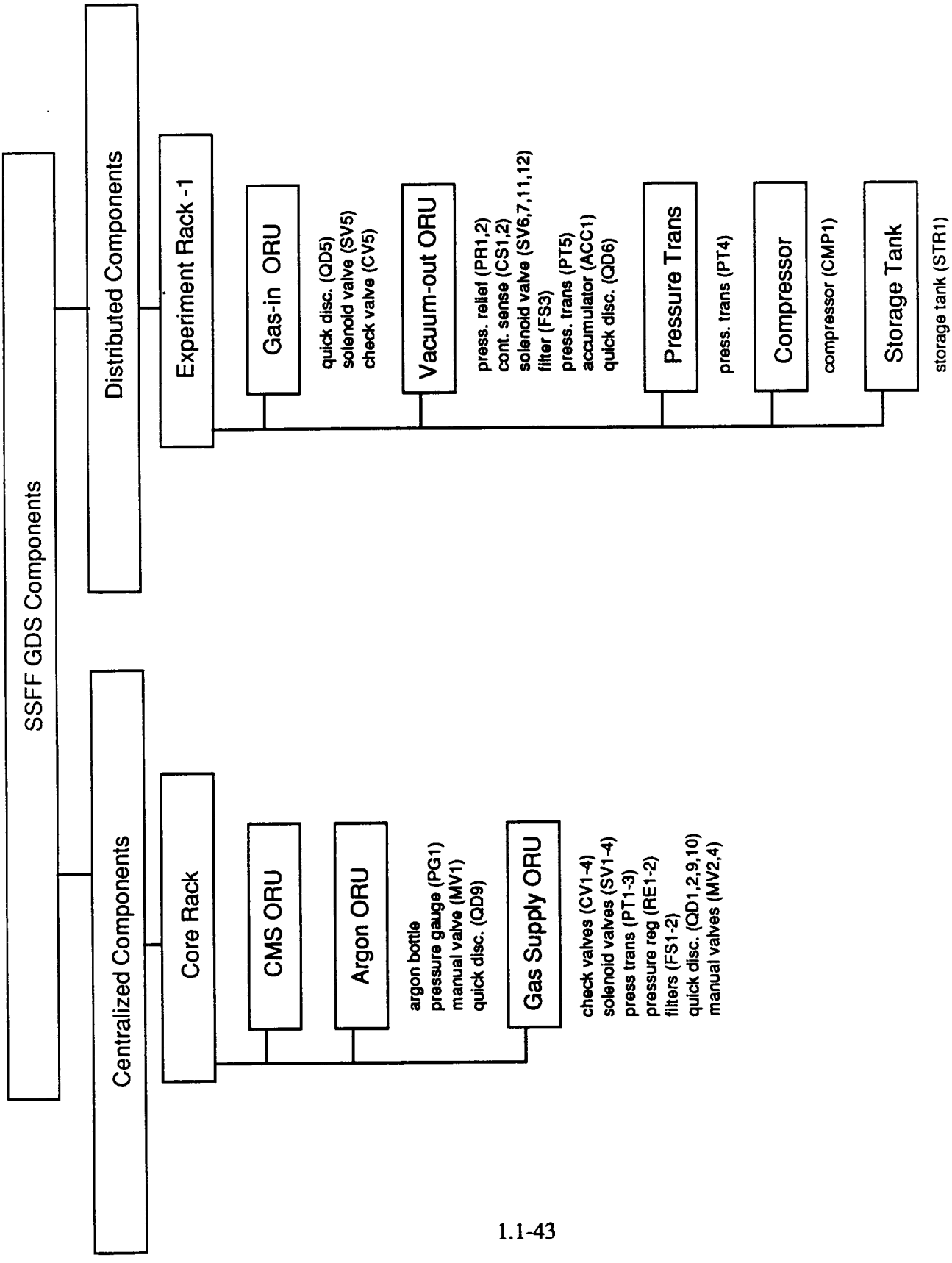


FIGURE 1.1-5. GDS COMPONENT TREE

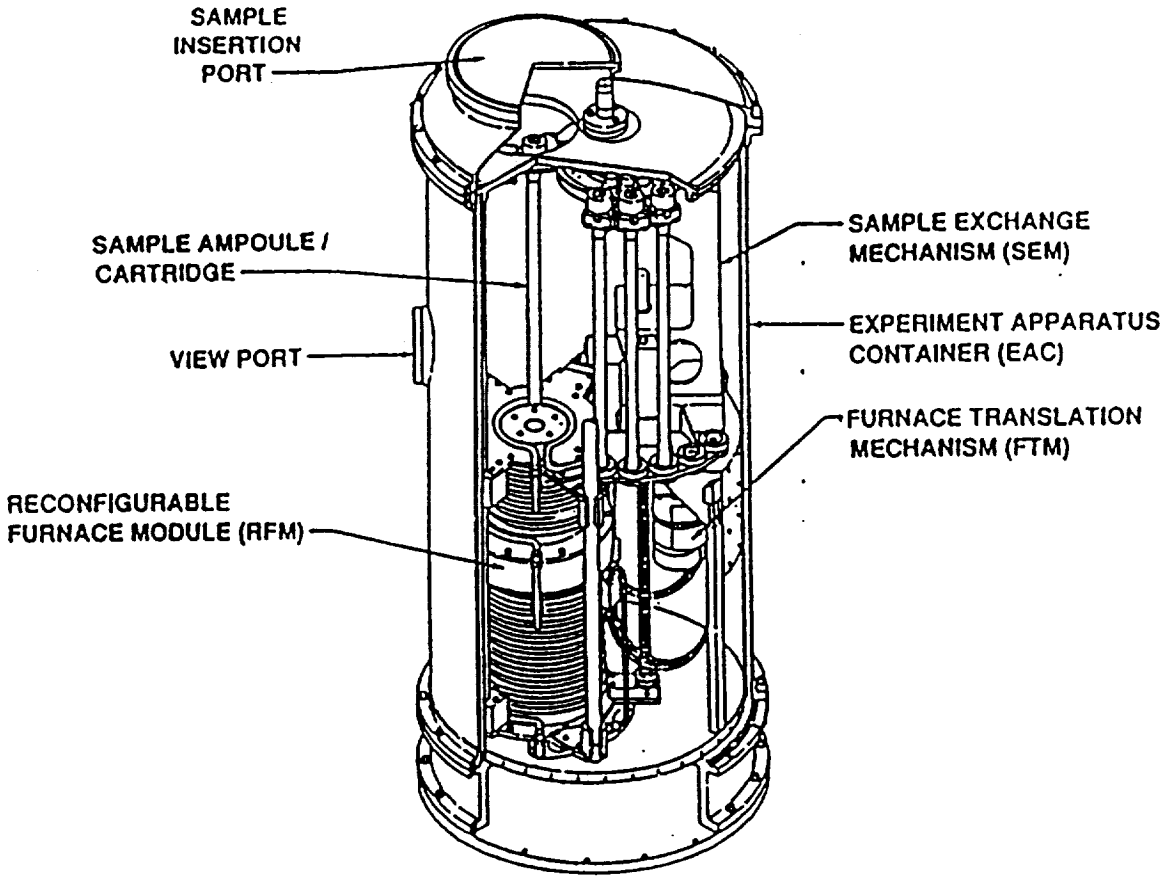
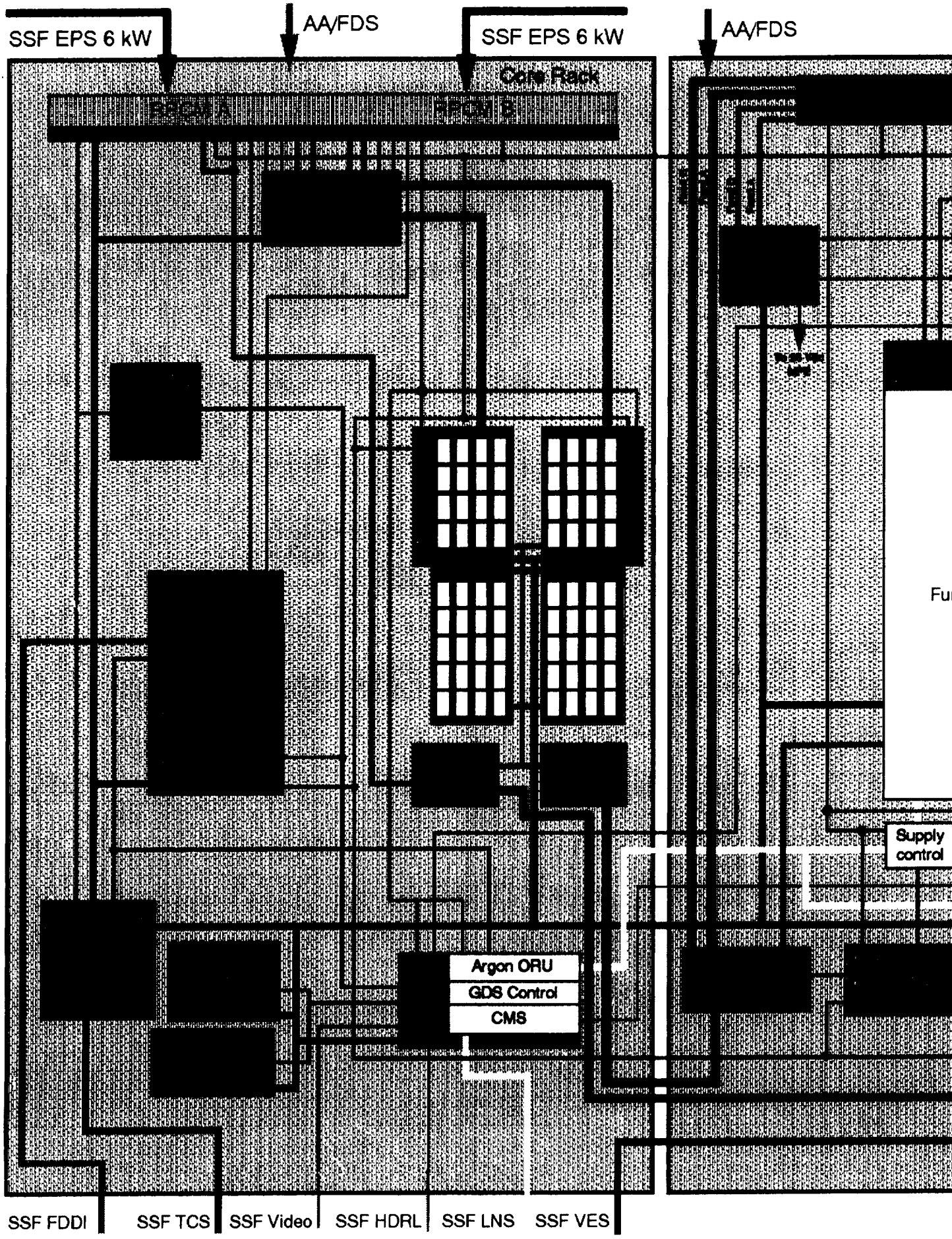


FIGURE 1.1-6. FURNACE MODULE-1 EQUIPMENT PICTORIAL REPRESENTATION

FOLDOUT FRAME

FIGURE 1.1-7.



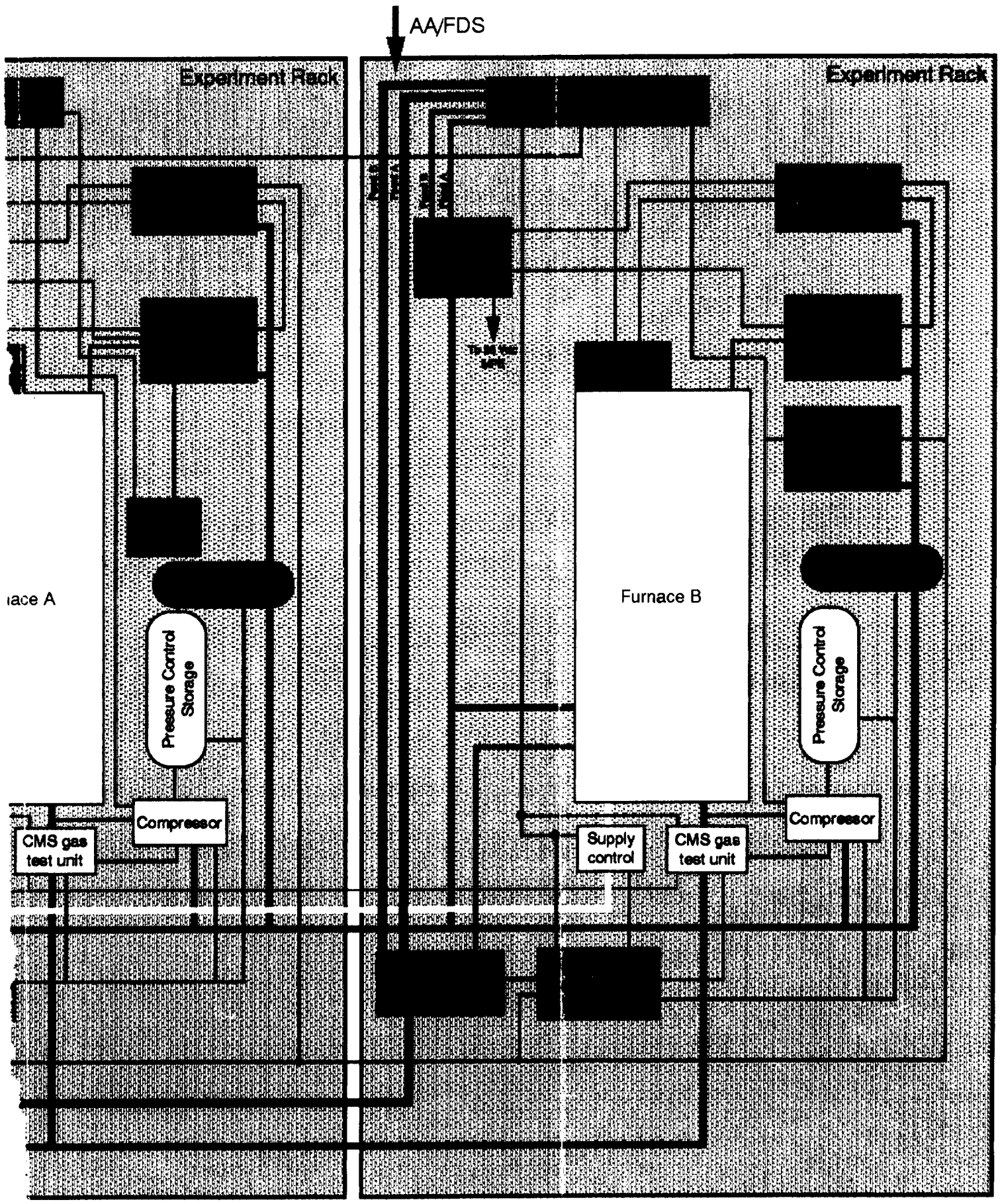

AA/FDS
Experiment Rack
Experiment Rack
iace A
Pressure Control Storage
Compressor
CMS gas test unit
Furnace B
Supply control
CMS gas test unit
Pressure Control Storage
Compressor

TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 1 of 19)

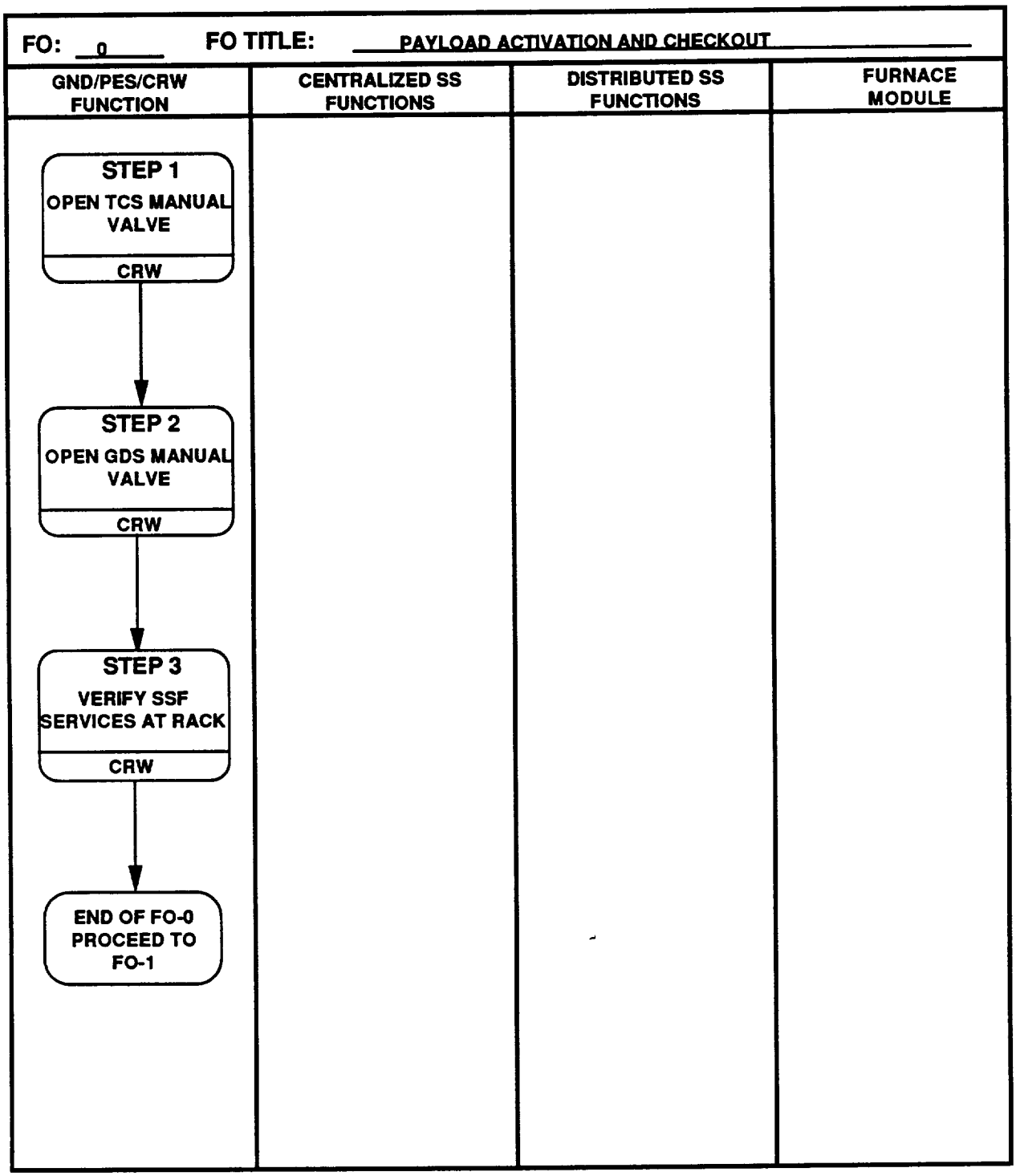


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 2 of 19)

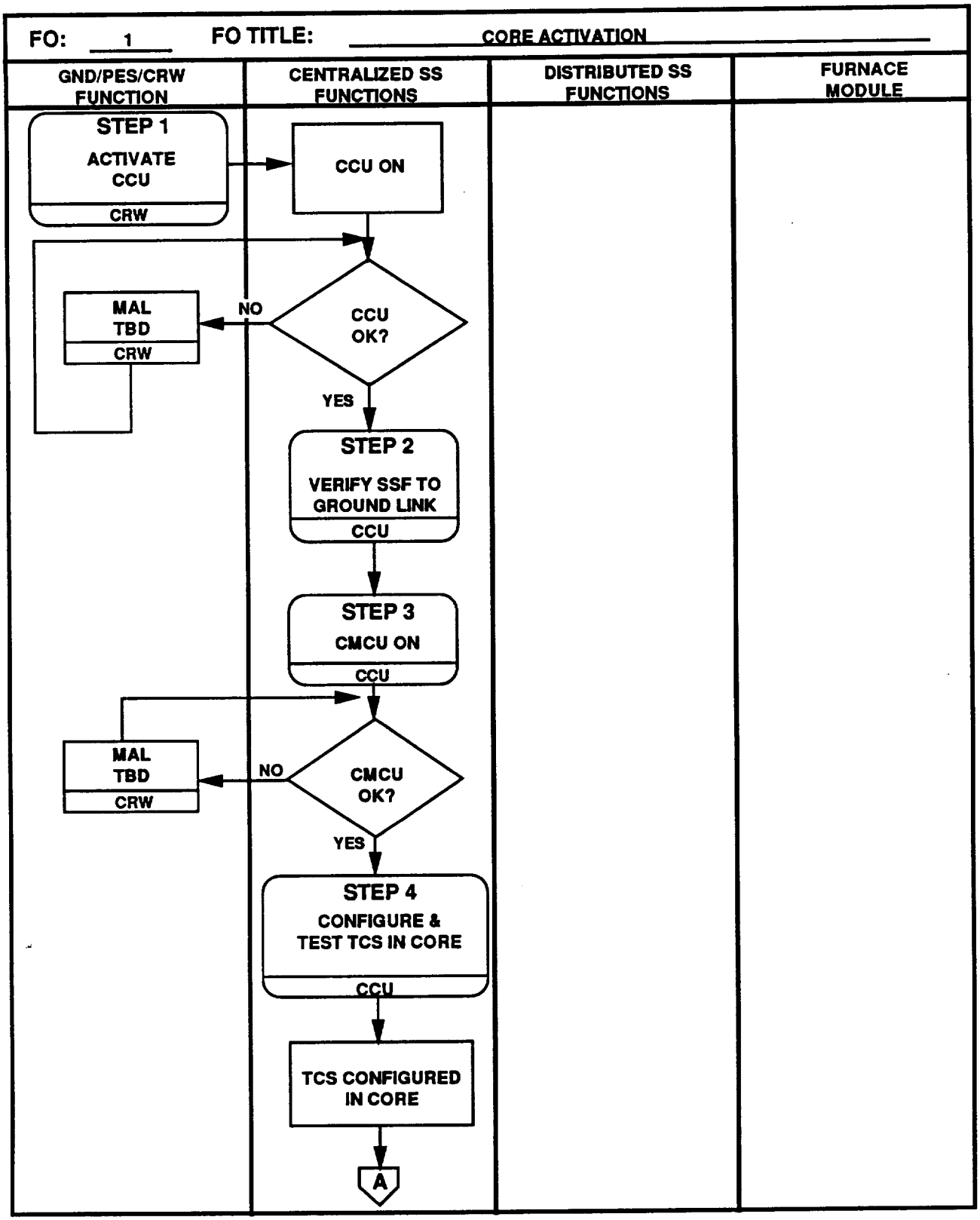


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 3 of 19)

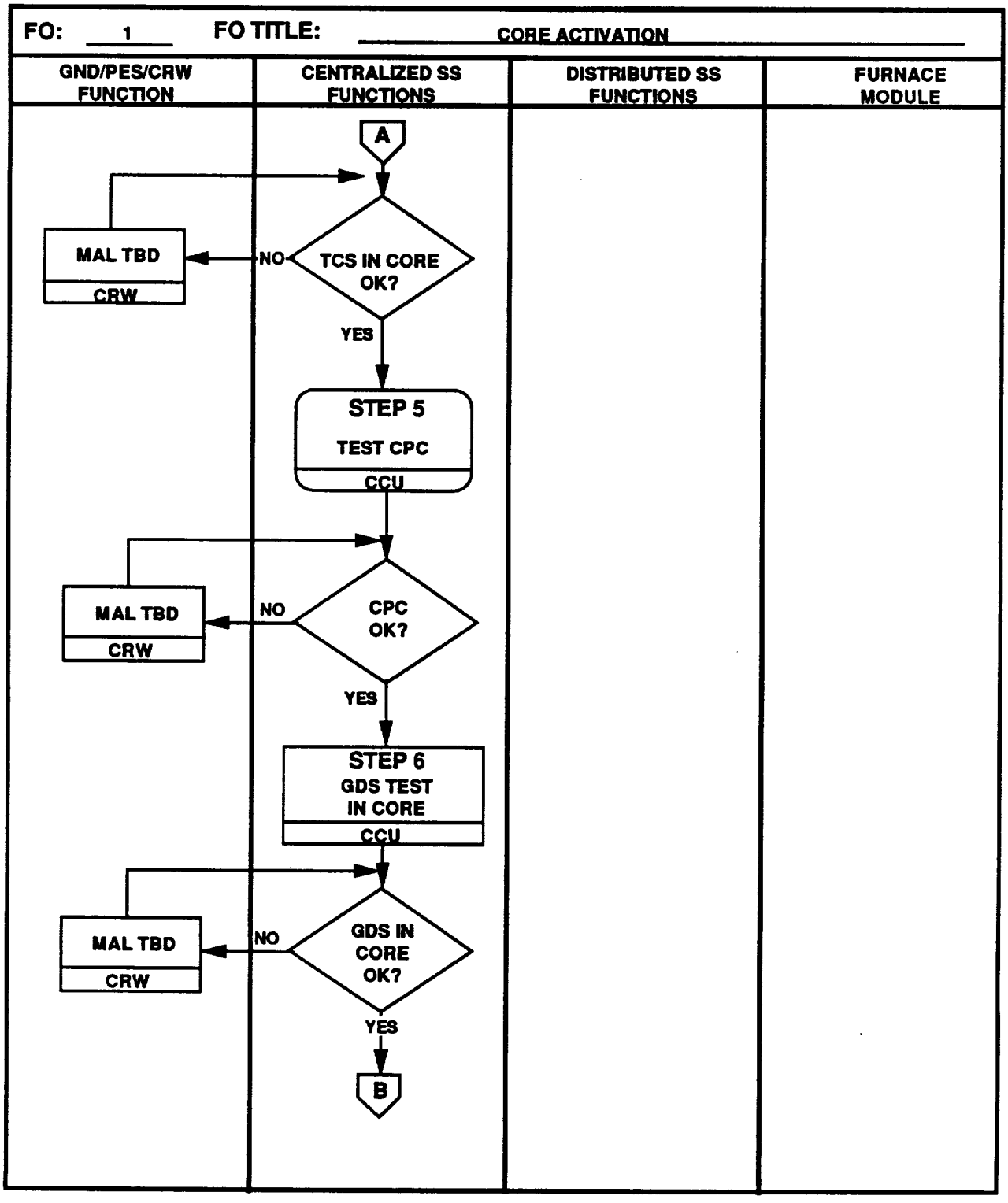


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 4 of 19)

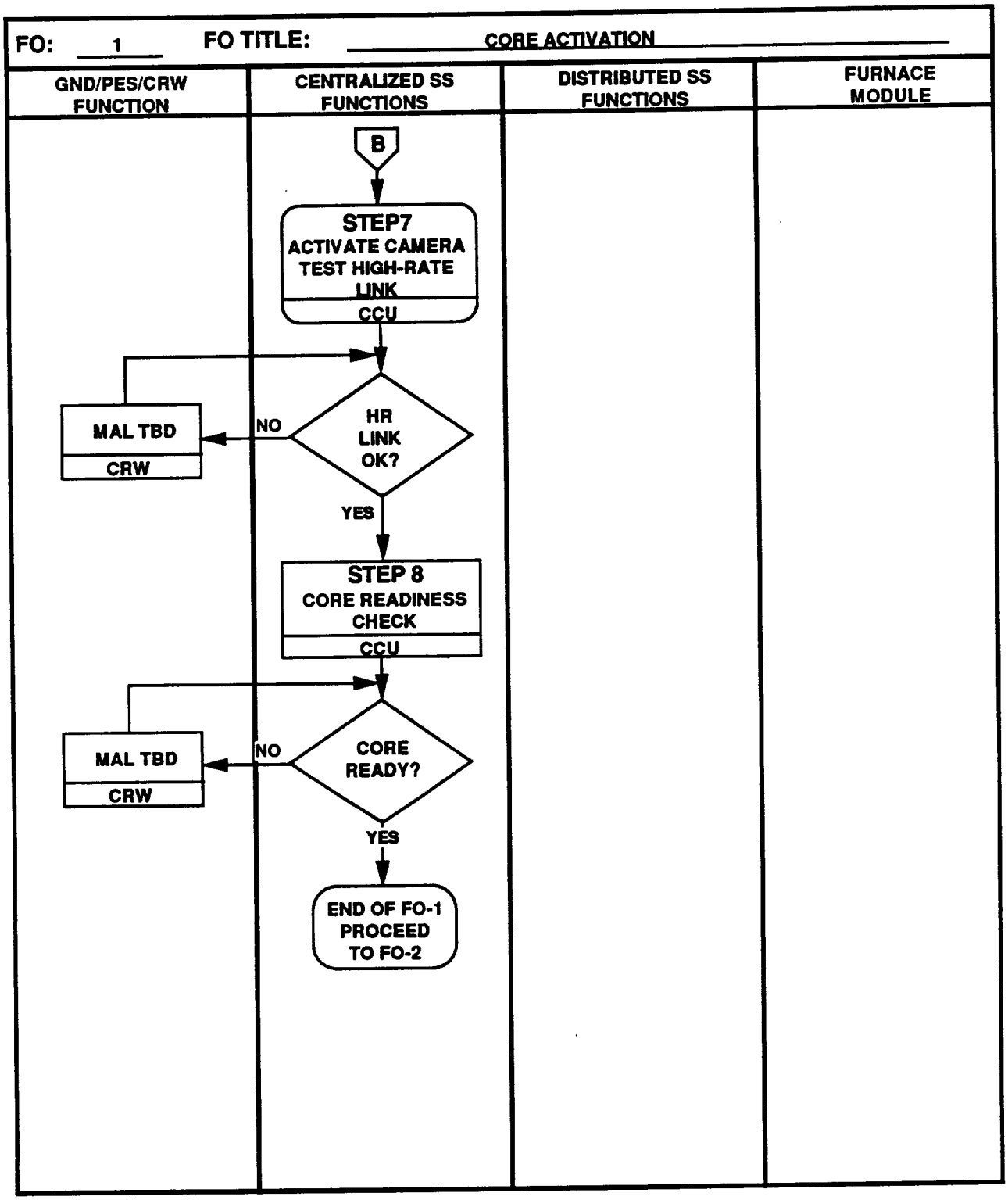


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 5 of 19)

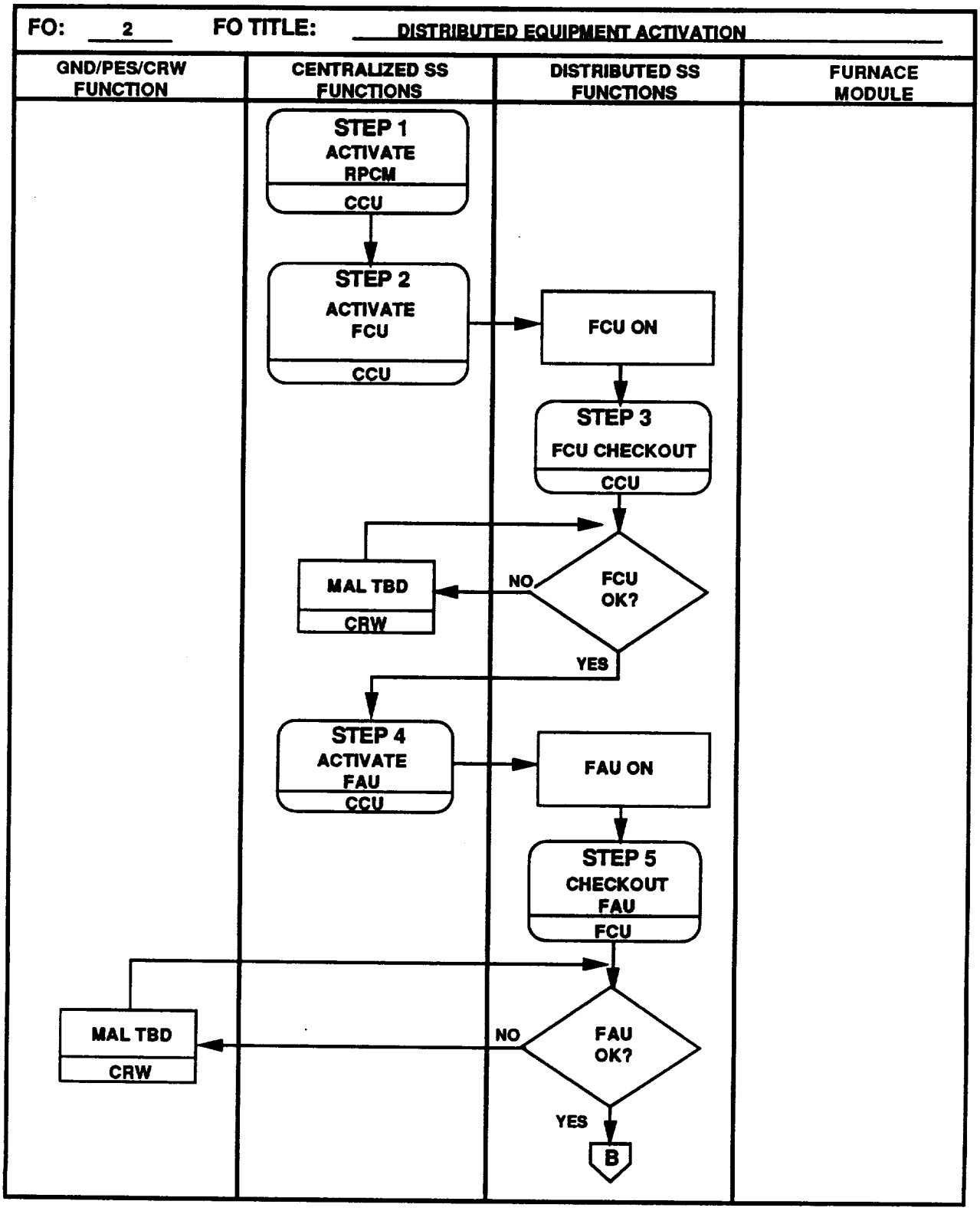


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 6 of 19)

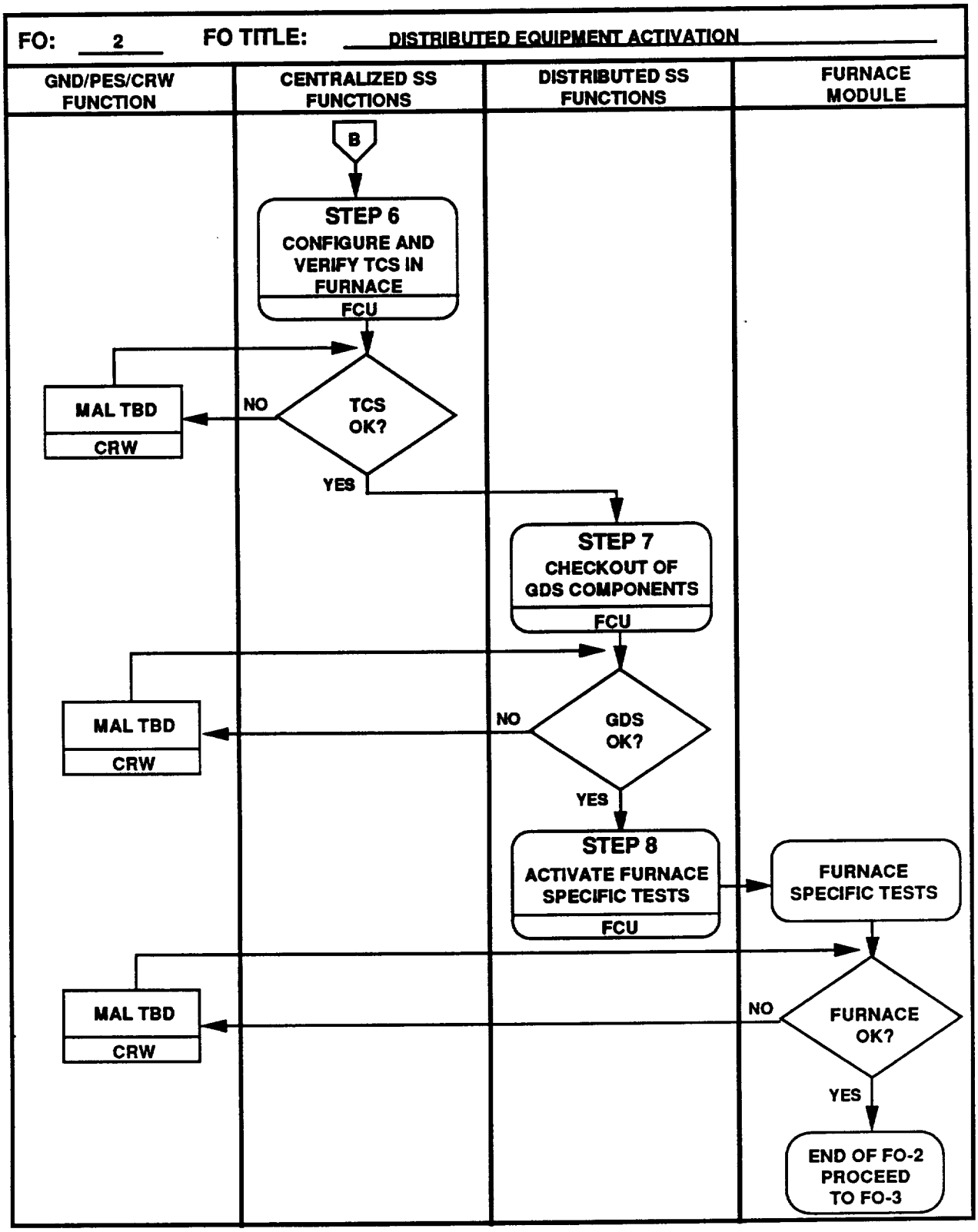


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 7 of 19)

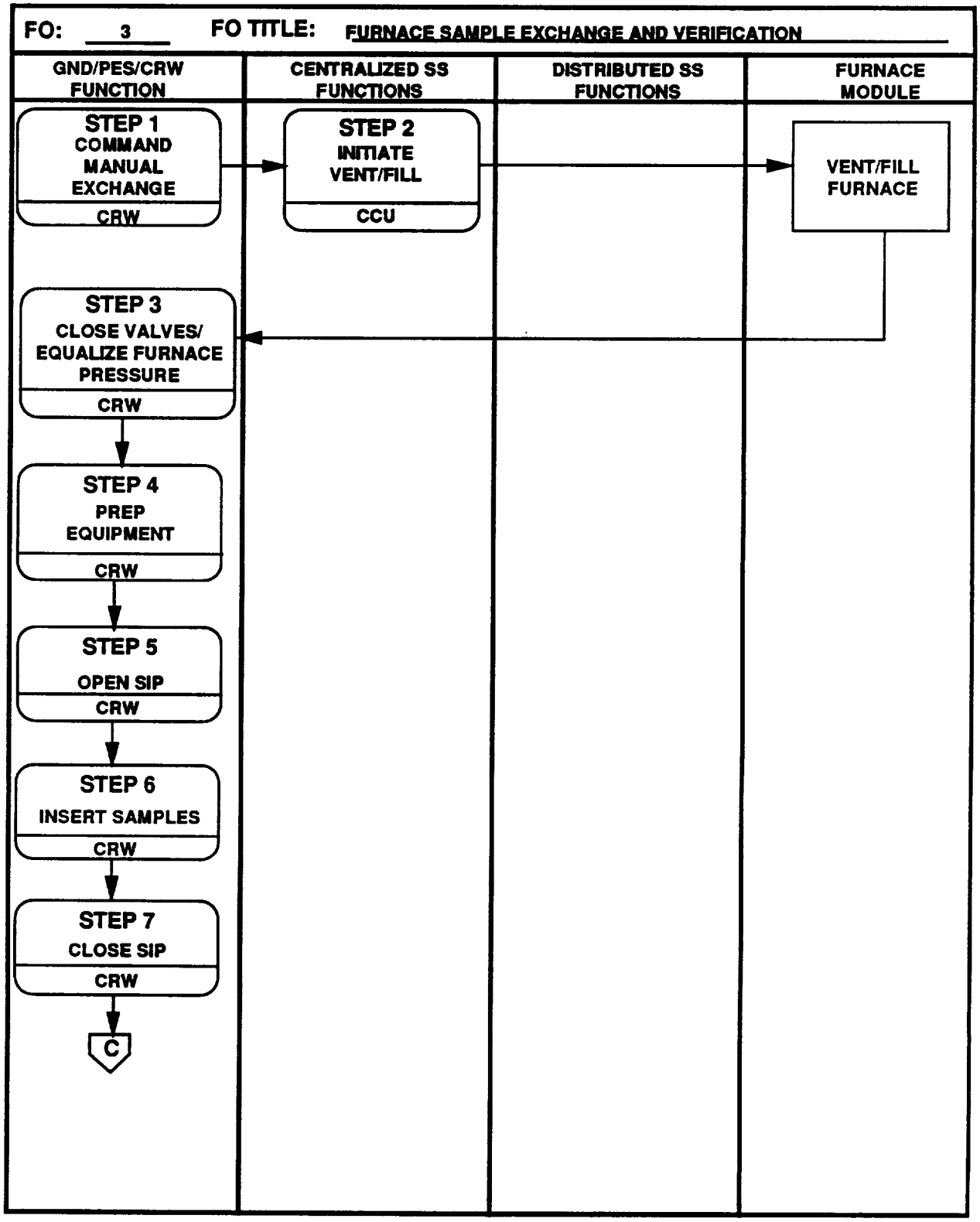


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 8 of 19)

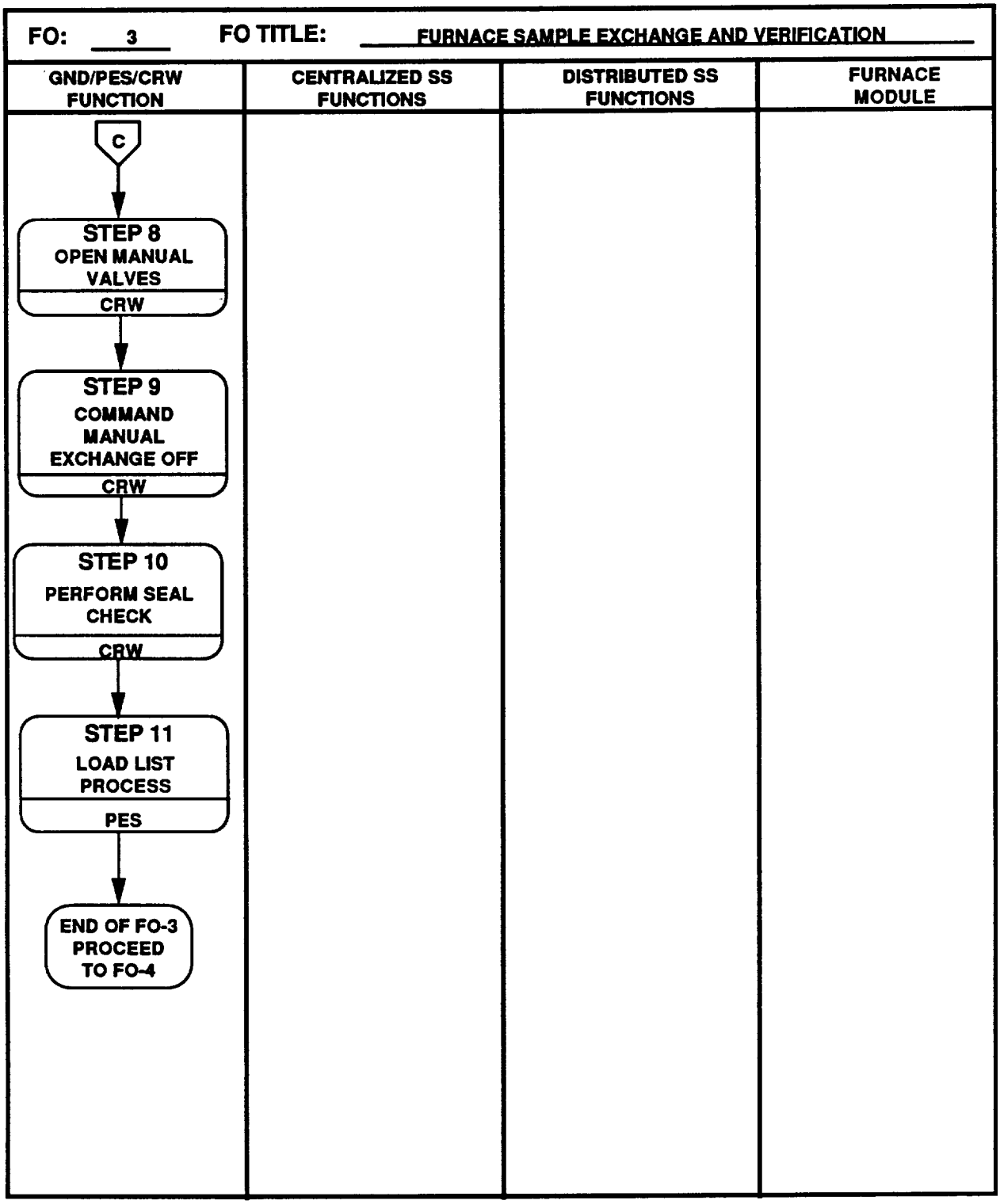


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 9 of 19)

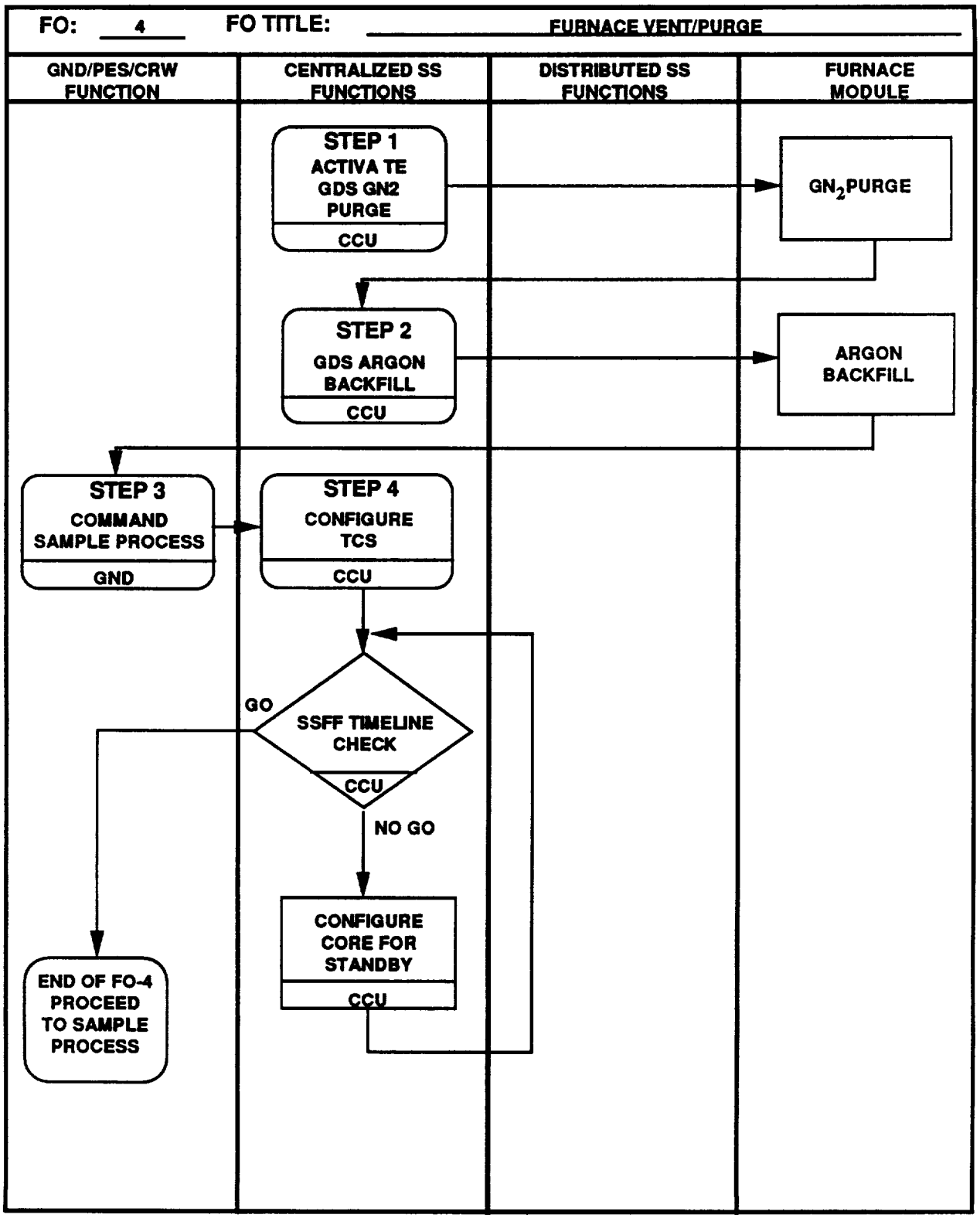


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 10 of 19)

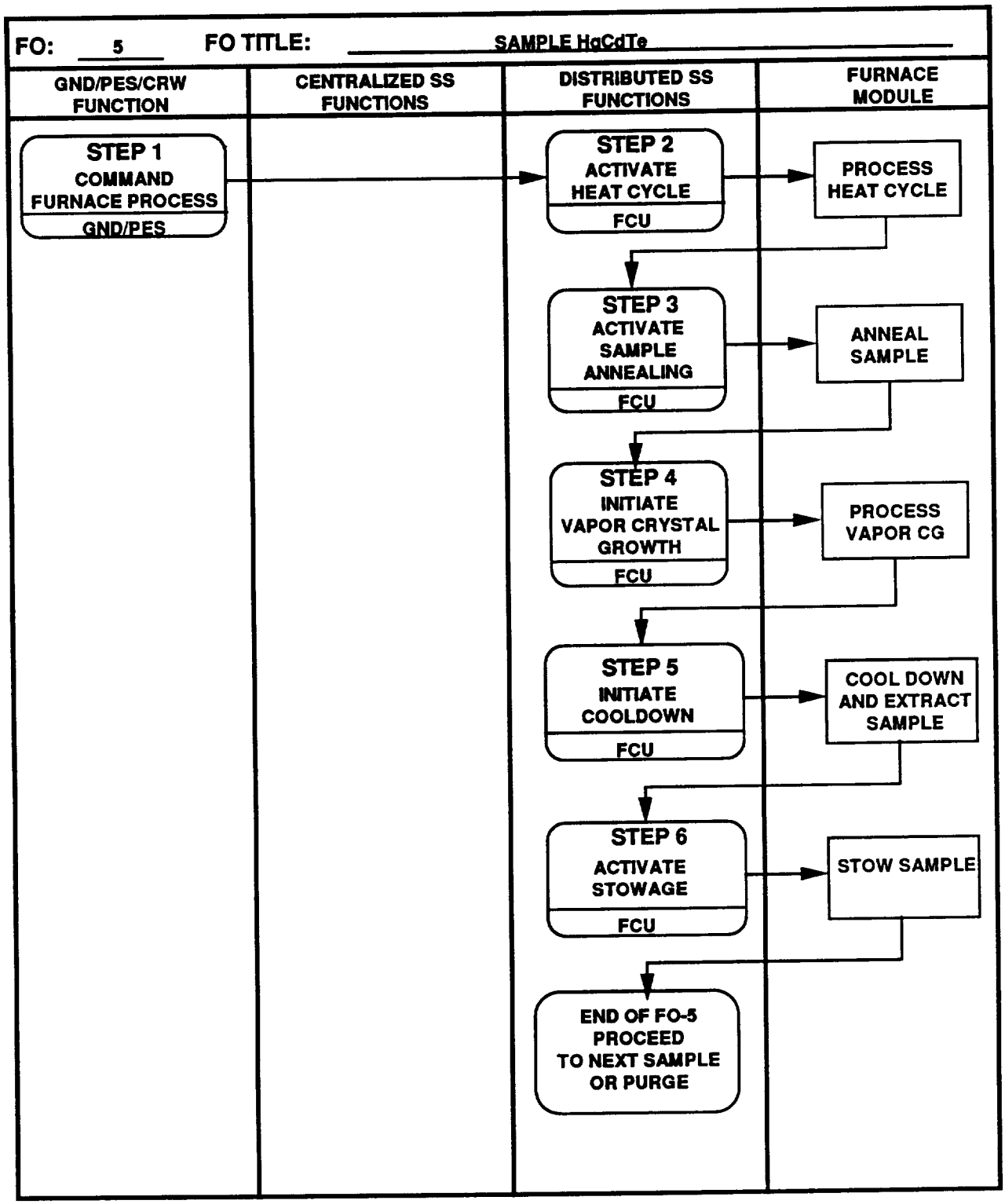


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 11 of 19)

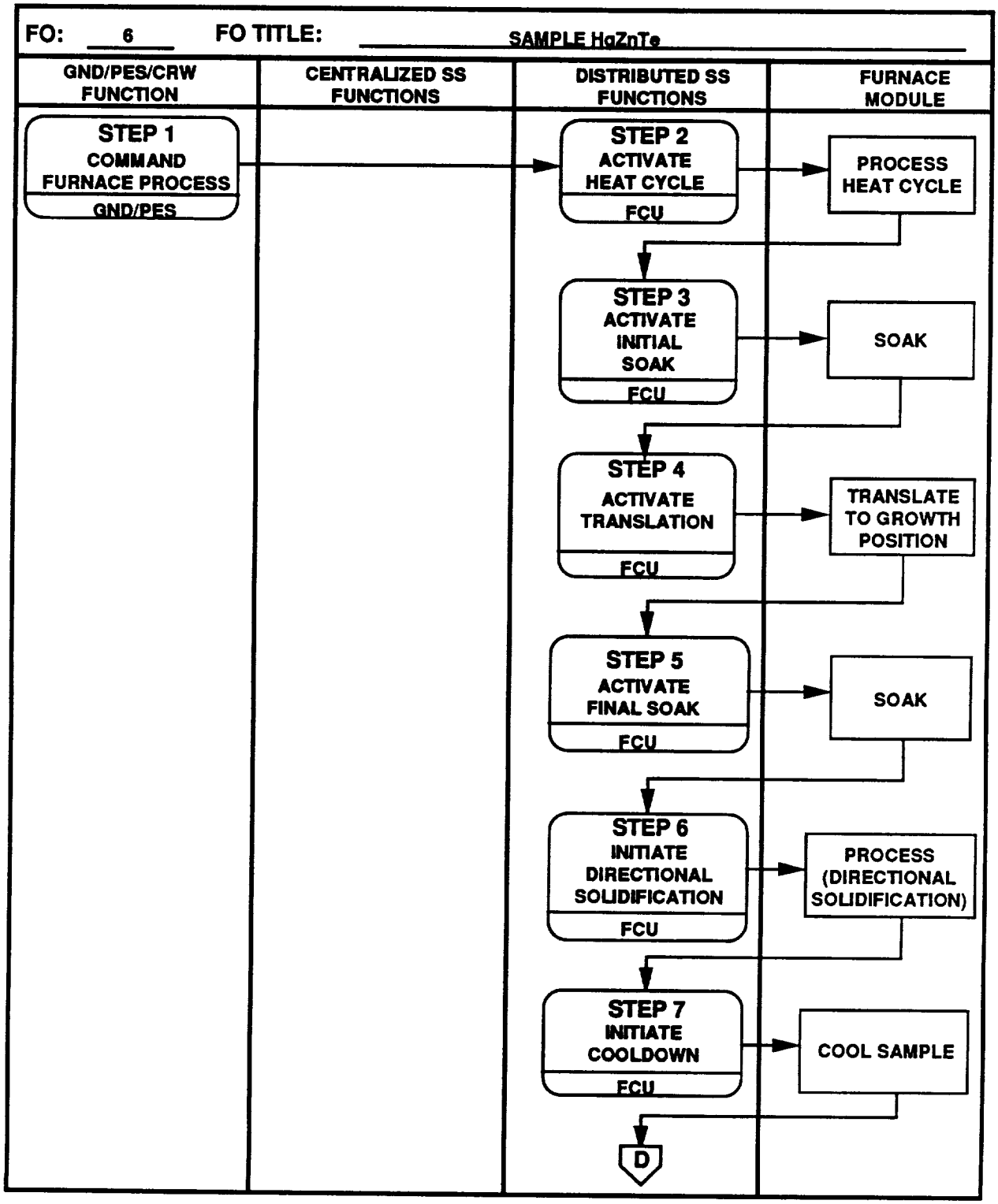


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 12 of 19)

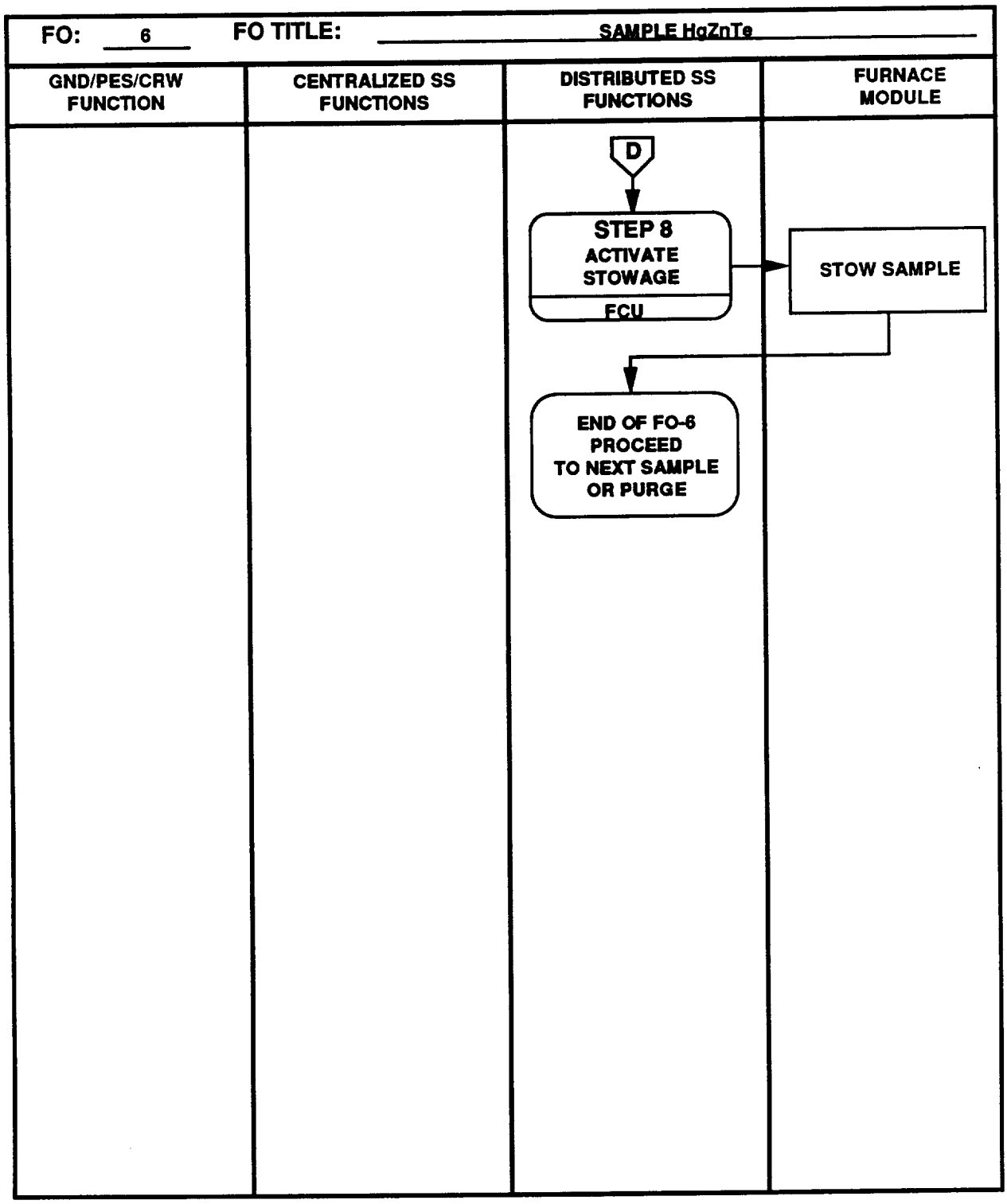


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 13 of 19)

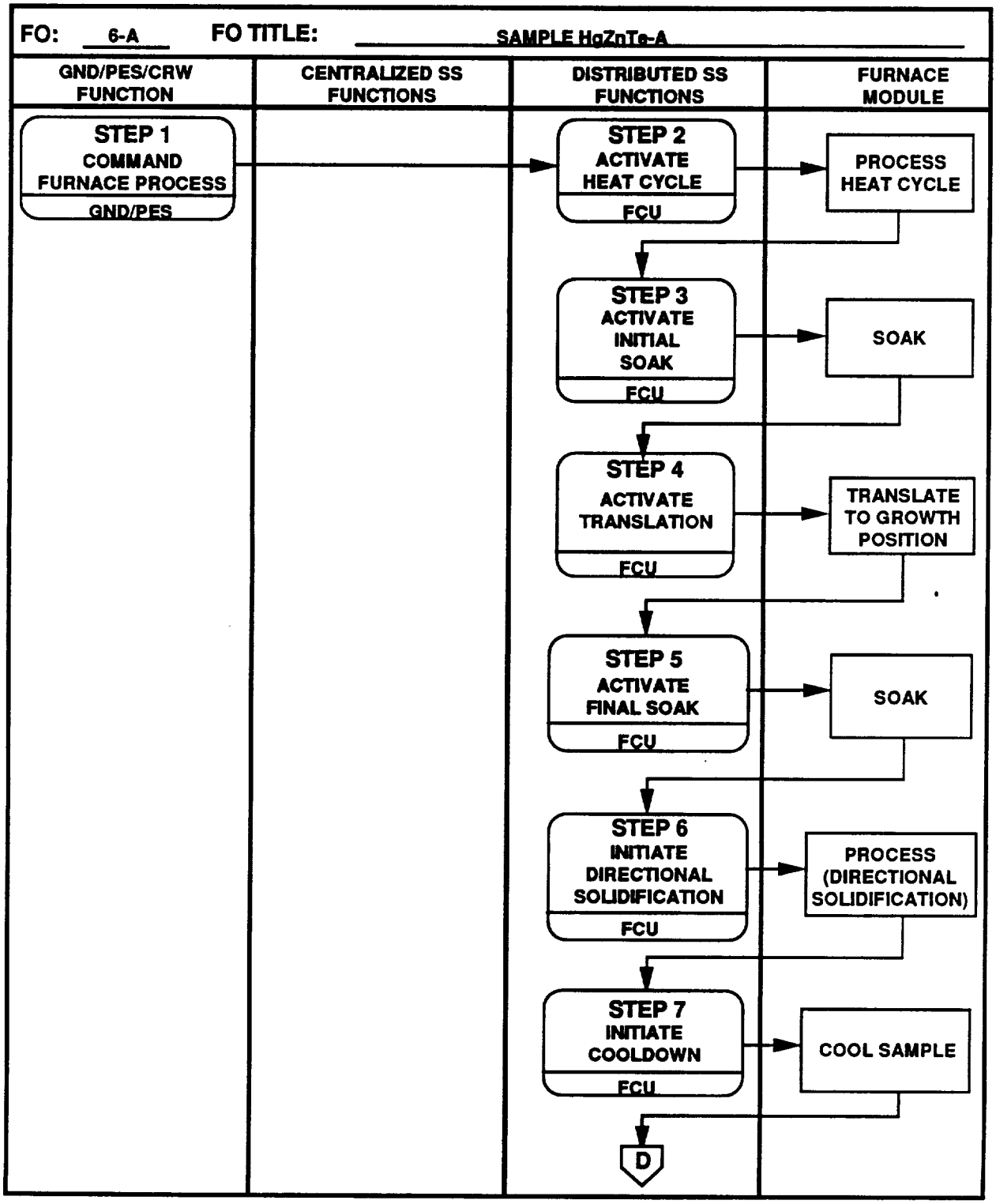


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 14 of 19)

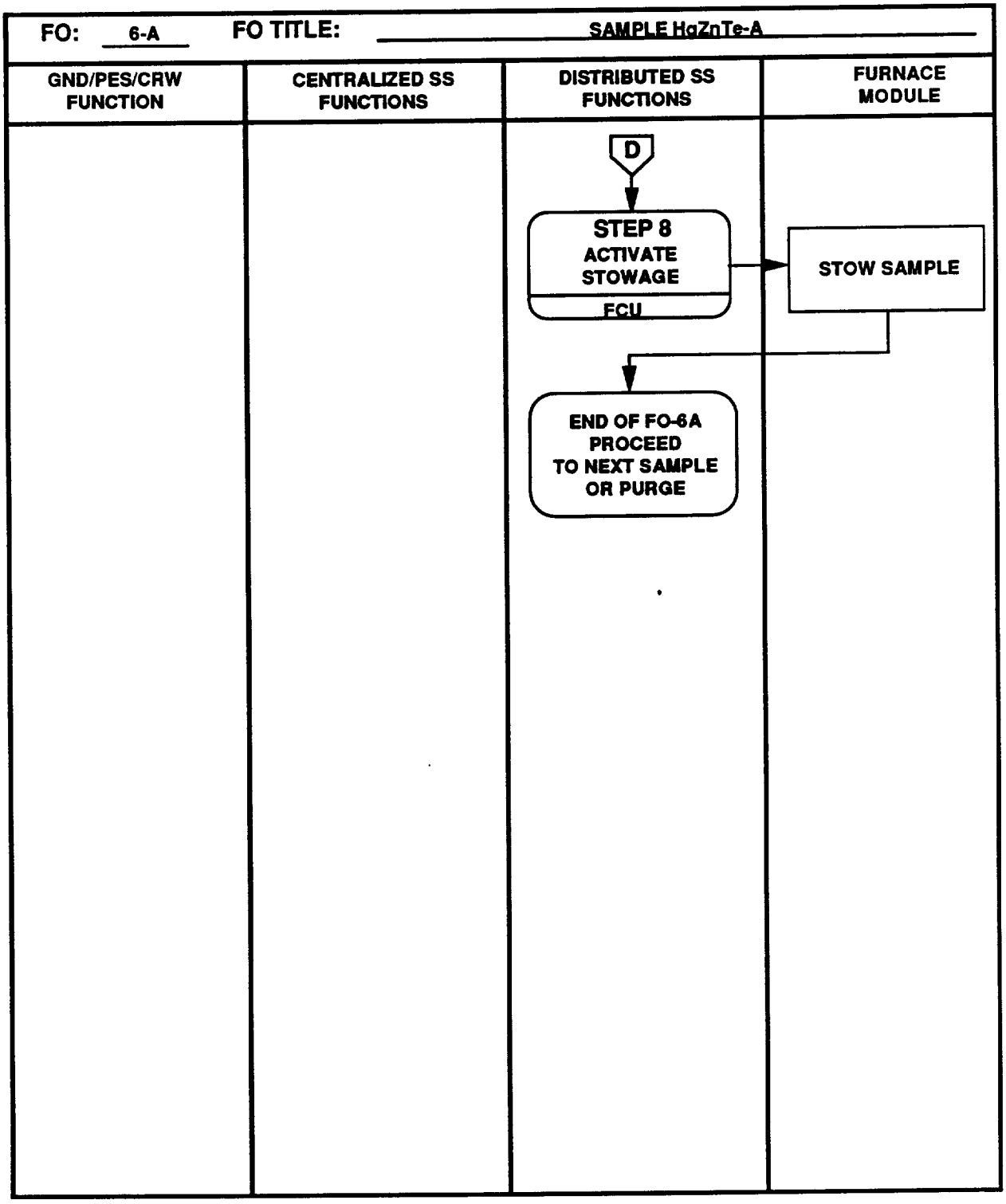


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 15 of 19)

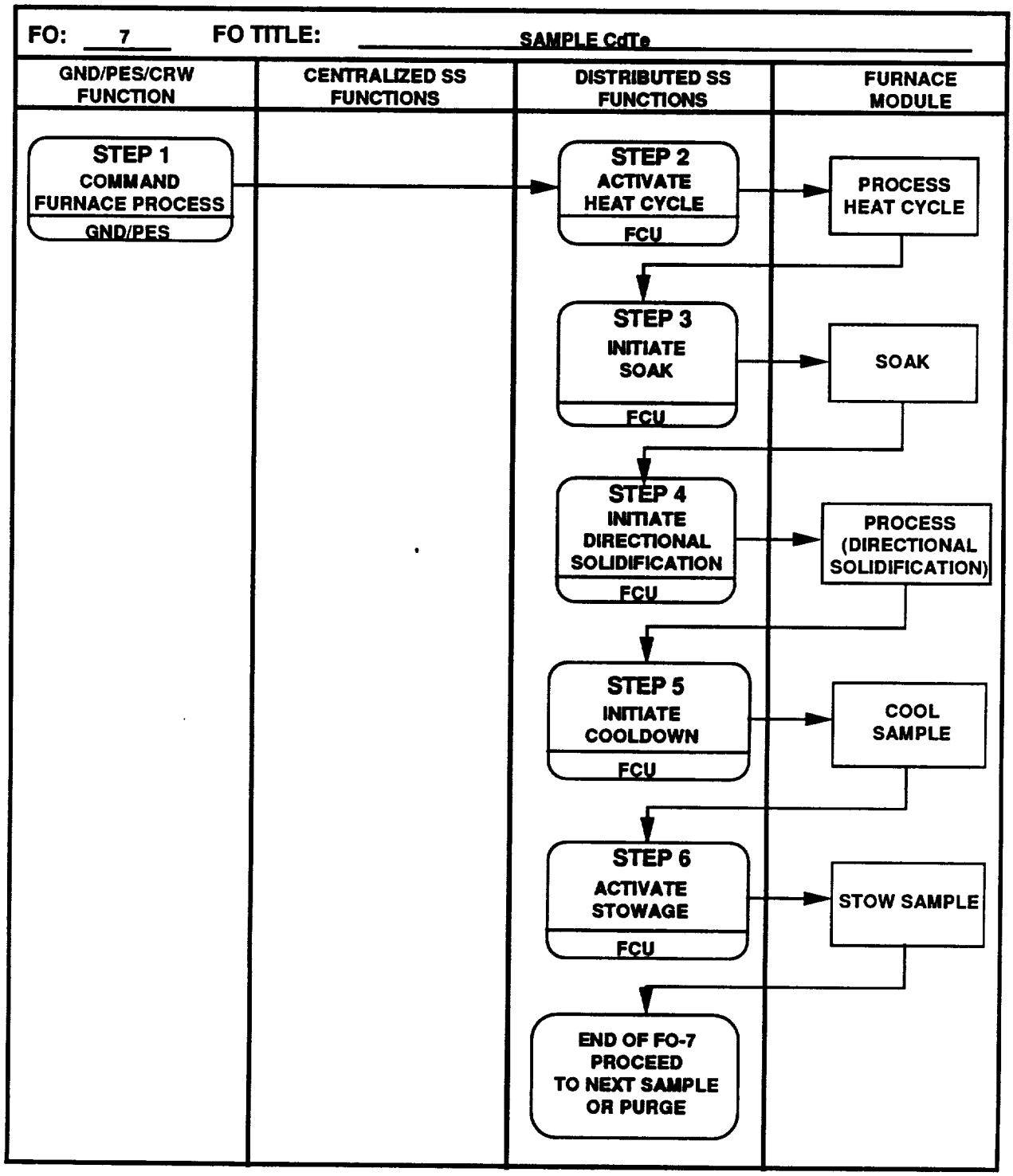


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 16 of 19)

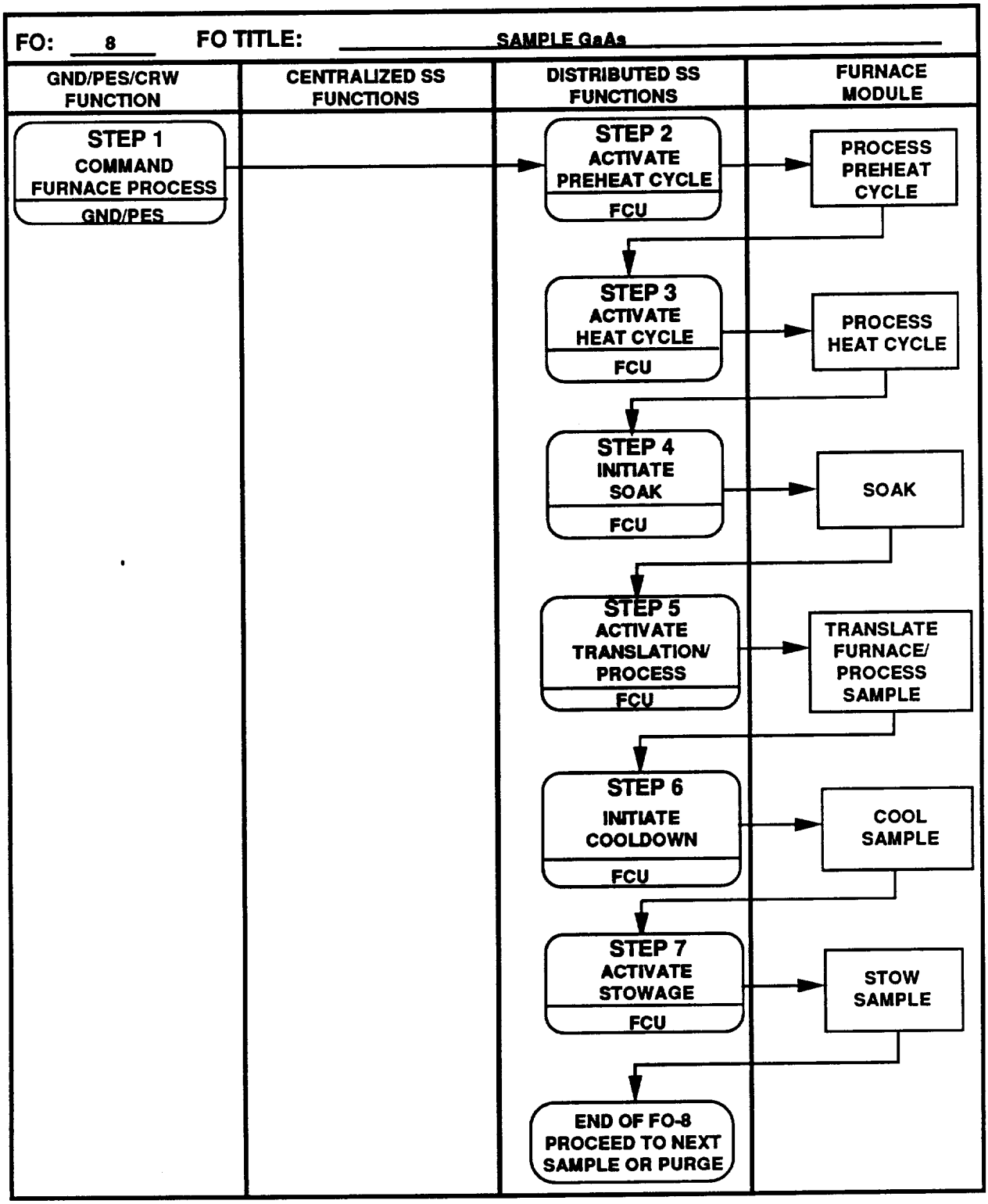


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 17 of 19)

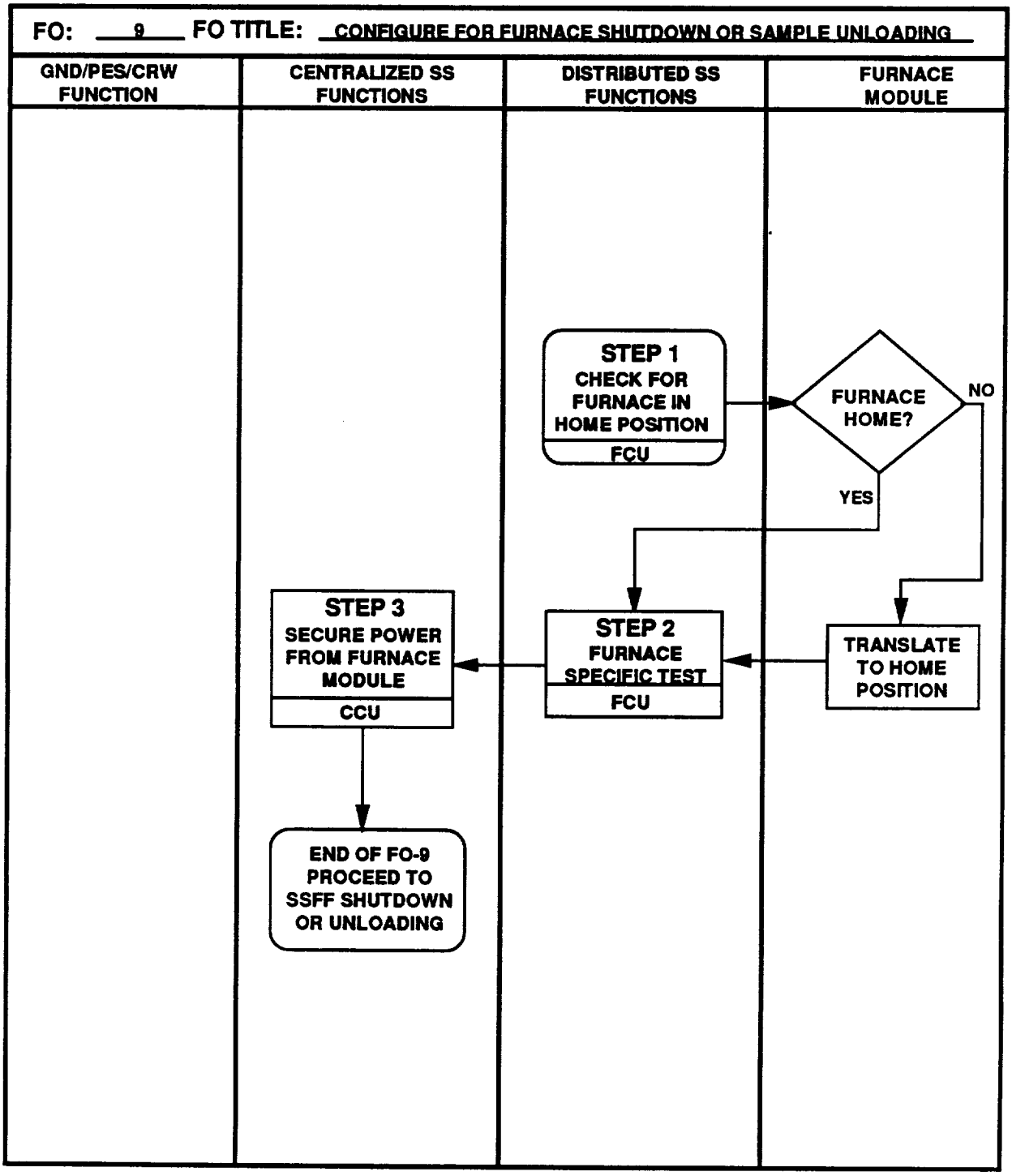


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 18 of 19)

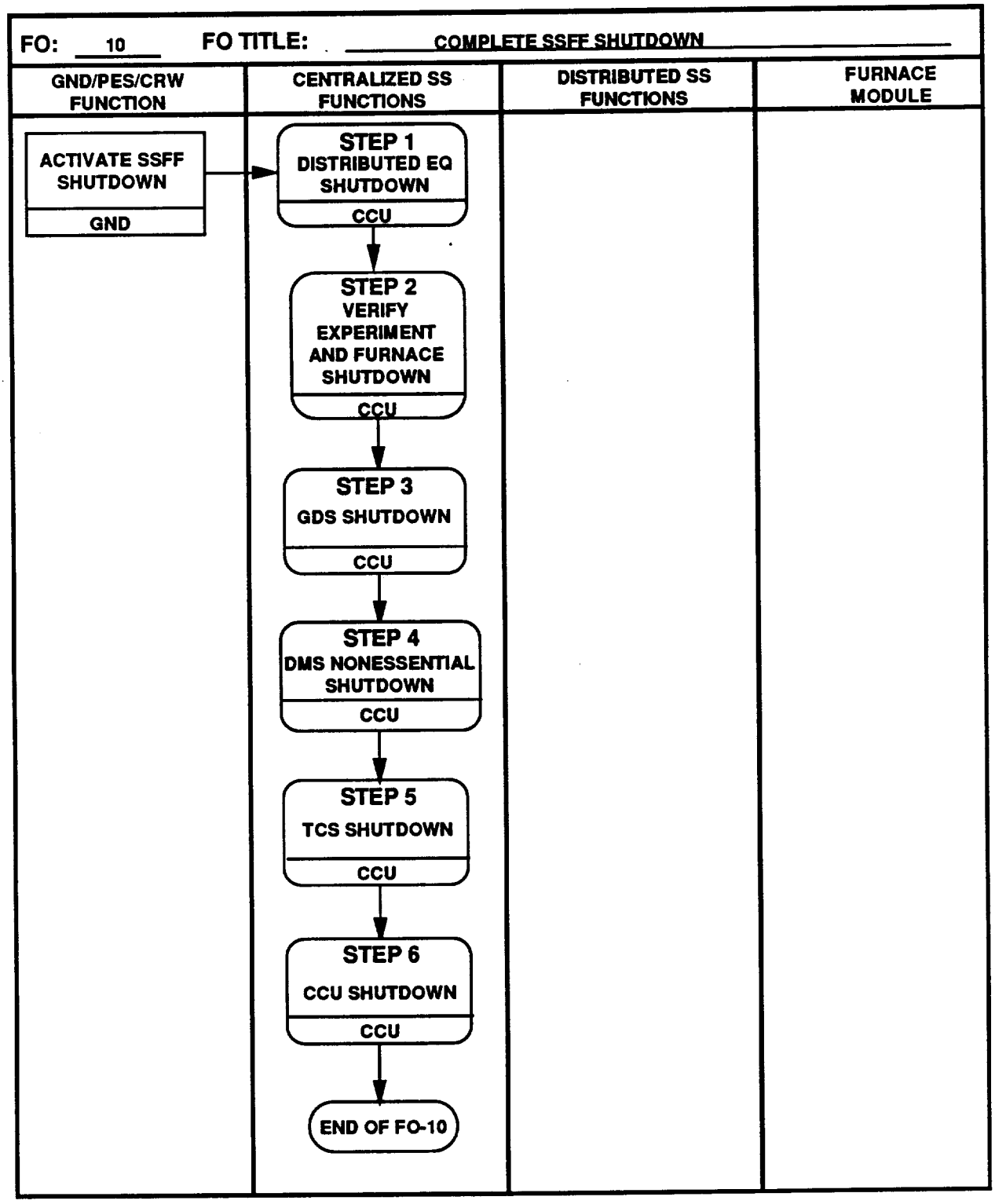
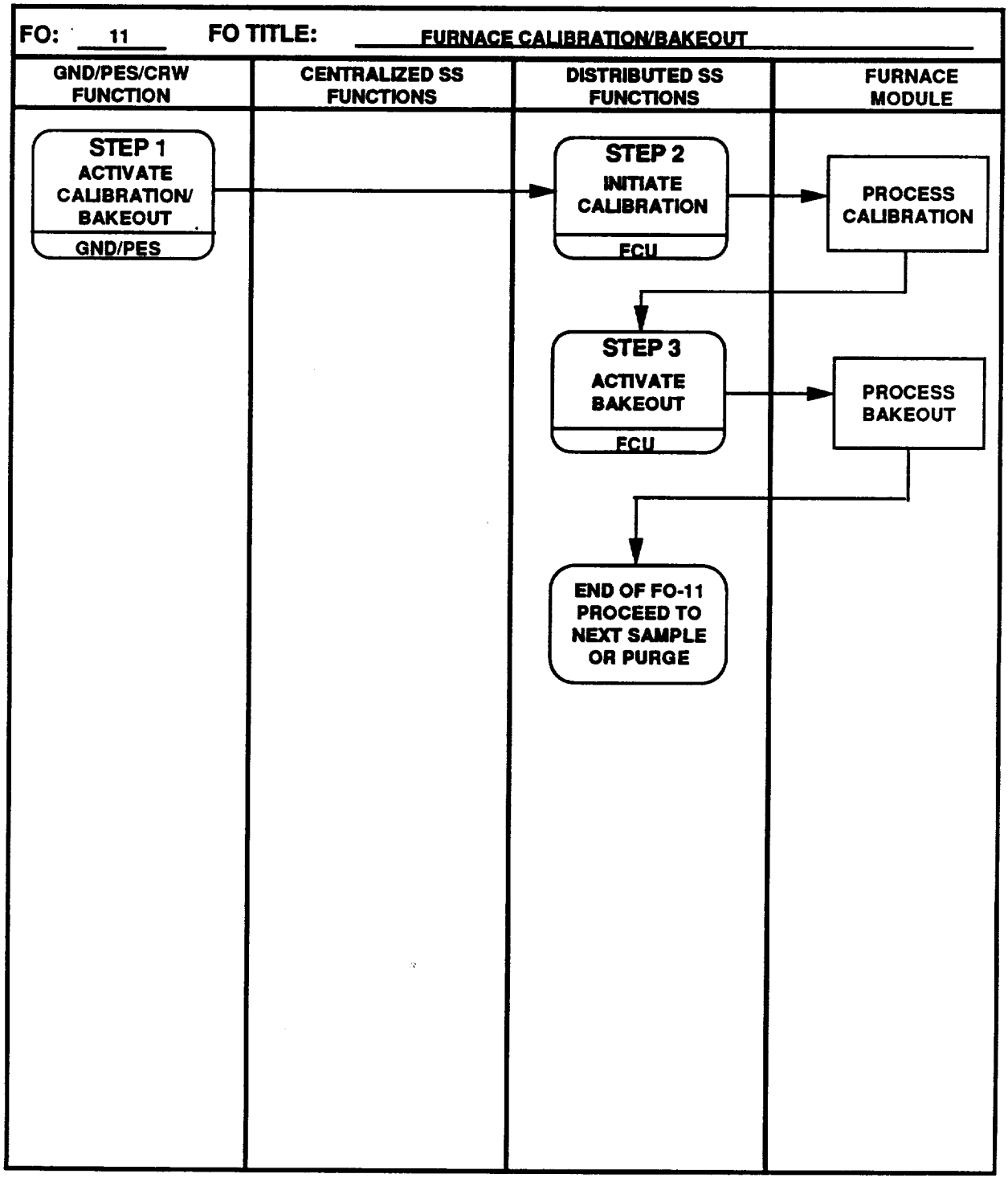


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 19 of 19)



1.2. STRUCTURAL/MECHANICAL

The Integrated Configuration-1 (IC1) Space Station Furnace Facility (SSFF) will be mounted in the U. S. Laboratory (USL) Module-A. The SSFF Core Rack will be mounted in a double rack location, and Experiment Rack-1 will be mounted in an adjacent double rack location. Figure 1.2-1 shows the SSFF system interface with Space Station Freedom (SSF). The physical and functional interfaces defined herein between SSFF and the USL are as follows:

- SSF-to-SSFF Mechanical Structures Subsystem (MSS) Physical Interfaces:
  - SSFF Core Rack to USL Module-A
  - SSFF Experiment Rack-1 to USL Module-A
  - SSFF Interconnect Tray Assembly to USL Module-A
- SSF-to-SSFF Core Rack Services Functional Interfaces:
  - SSF Electrical Power System (EPS) to SSFF Core Rack
  - SSF Data Management Subsystem (DMS) to SSFF Core Rack
  - SSF Thermal Control Subsystem (TCS) to SSFF Core Rack
  - SSF Vacuum Exhaust System (VES) to SSFF Core Rack
  - SSF Liquid Nitrogen System (LNS) to SSFF Core Rack
  - SSF avionics air to SSFF Core Rack
  - SSF fire detection and suppression to SSFF Core Rack
- SSF-to-SSFF Experiment Rack-1 Services Functional Interfaces:
  - SSF avionics air to SSFF Experiment Rack-1
  - SSF fire detection and suppression to SSFF Experiment Rack-1
- Crew Interface

1.2.1 EQUIPMENT LIST AND MASS PROPERTIES

Mass properties of the SSFF are shown in Table 1.2-1. Stowage items and their properties are shown in Table 1.2-2.

1.2.2 INTERFACE DETAIL

1.2.2.1 SSF-to-SSFF MSS Interface

The SSFF MSS will interface with SSF by physical connections of the Core Rack, Experiment Rack-1, and the MSS Interconnect Tray Assembly. The Core Rack and Experiment Rack-1 are rack replacement structures modified from an International Standard Payload Rack (ISPR), and they attach to the USL at the ISPR pivot points and attach fitting locations. Figure 1.2-2 shows the Core Rack interface with SSF, and Figure 1.2-3 shows the Experiment Rack-1 interface with SSF. Figure 1.2-4 shows the Interconnect Tray Assembly, which provides support for the cabling and plumbing between the Core Rack and Experiment Rack-1. The Interconnect Tray Assembly attaches to the USL in the standoff.

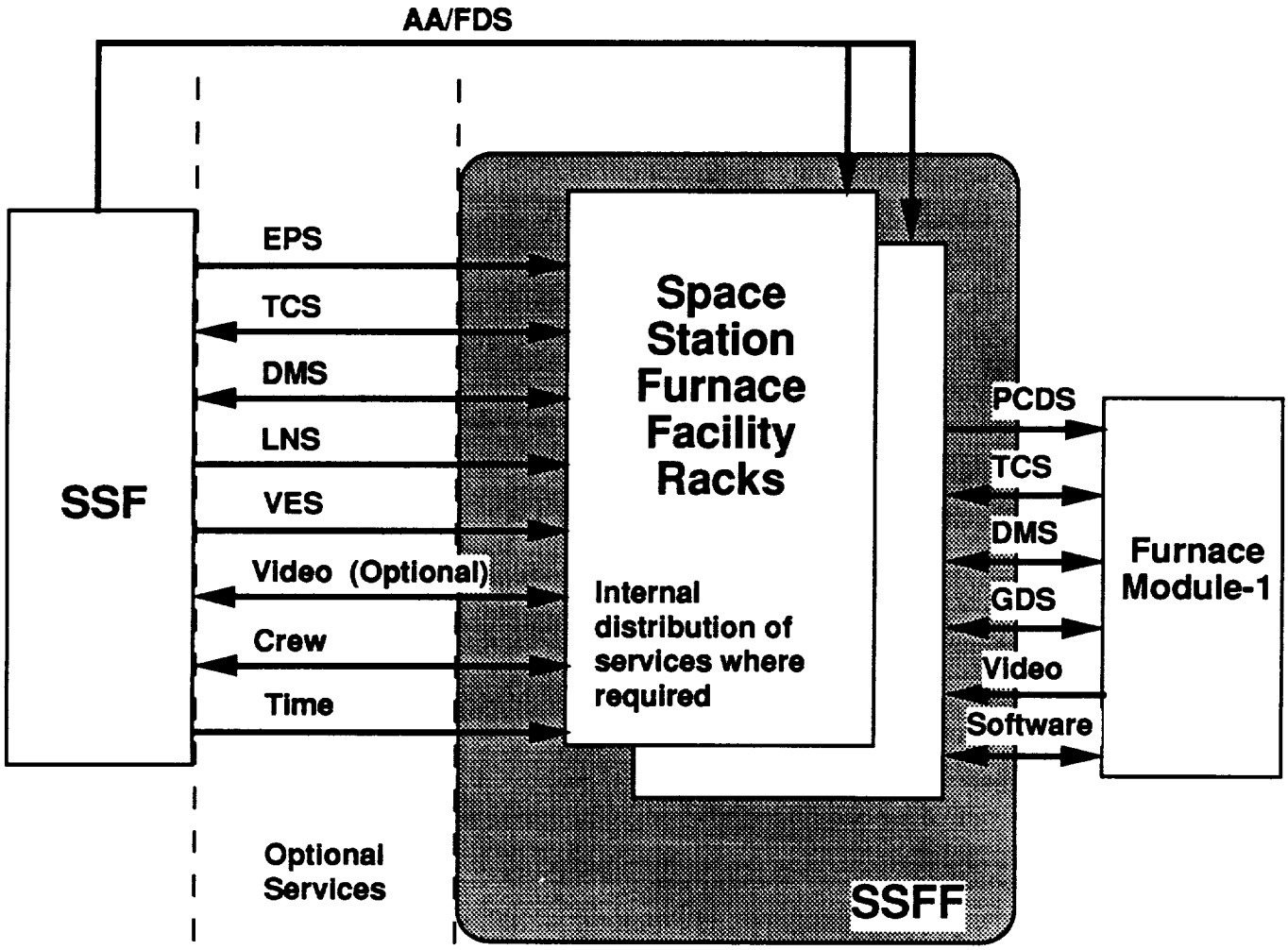


FIGURE 1.2-1. SSFF TO SSF RESOURCE INTERFACES

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 1 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
GAS DISTRIBUTION SUBSYSTEM:														
Centralized Equipment:														
Argon+bottle (1)	17.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Latching Sol. Valves (4)	4.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valves, 1/4" (4)	0.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valve, 1" (1)	2.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Regulators (2)	1.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Filter, 1/4" (2)	0.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Sensors (3)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Gauge (1)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Contamin. Monitor (1)	18.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve, 1/4" (4)	0.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1/4" (4)	0.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1" (2)	3.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing/hose/fittings	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Latch. Sol Valve (6)	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Press. Relief Valves (2)	0.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Filter, 1" (1)	3.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Compressor (1)	15.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Storage Tank (1)	17.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Accumulator (1)	8.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valves (2)	0.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CM Sensor (2)	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Sensors (3)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1/4" (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1" (1)	1.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve, 1/4" (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing/hose/fittings	1.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 2 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
DATA MANAGE-MENT SUBSYSTEM														
Centralized Equipment:														
Core Control Unit (1)	29.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Hard Drive (1)	22.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CDROM/WORM (1)	7.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
High-Density Recorder (1)	57.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Monitor & Control Unit (1)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Crew Interface (1)	23.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CPCS (2)	36.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cabling (AR)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Furnace Control Unit (1)	43.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Actuator Unit (1)	29.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
DCMU (1)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cabling (AR)	6.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
POWER CONDITION-ING AND DISTRIB. SUBSYSTEM														
Centralized Equipment:														
Core Power Distrib. (1)	42.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Pwr Conditioner (1)	47.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Junction Box-A (1)	4.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Junction Box-B (1)	4.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 3 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
POWER CONDITIONING AND DISTRIB. SUBSYSTEM (Cont.)														
Centralized Equip. (cont.)														
Essentials Pwr Supp. (1)	3.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Volt./Current Sensors (4)	2.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Line and Connectors	11.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Current Pulsing Equipment (1)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Pwr. Dist. (1)	7.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Junction Box (1)	9.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Essentials Pwr Supp. (1)	4.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Volt./Current Sens. (66)	33.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Line and Connectors	3.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
THERMAL CONTROL SUBSYSTEM														
Centralized Equipment:														
Heat Exchanger (1)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pump Package (1)	15.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Meters (2)	1.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Control Valves (2)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Temperature Sensors (5)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Transducers (3)	1.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Custom Coldplates (4)	24.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
-5 Coldplates (2)	3.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 2-1. List of Equipment Properties (Sheet 4 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
THERMAL CONTROL SUBSYSTEM														
Centralized Equip. (Cont.):														
Pwr Mod CP-Upper (2)	12.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pwr Mod CP-Lower (2)	9.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing (25 m)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Quick Disconnects (37)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valves (2)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valves (2)	0.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Shutoff Valves (2)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Water	10.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Modified -7 CPs (3)	11.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Temperature Sensors (3)	0.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Transducer (1)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Meter (1)	0.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Control Valve (1)	1.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valve (1)	0.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Shutoff Valve (1)	1.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing (12 m)	6.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Quick Disconnects (16)	1.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Water	7.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 5 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
MECHANICAL STRUCTURES SUBSYSTEM:														
Interconnect Tray	72.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Centralized Equipment:														
TCS	22.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
PCDS	31.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
GDS	21.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
DMS	56.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Exp. Rack-1 MSS	28.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Rack Replacement Structures:														
Core Rack	92.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Experiment Rack-1	128.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnaces:														
Furnace Module-1	327.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

320REQ0007

TABLE 1.2-2. STOWAGE LIST

Item	Number Required	Mass Each (kg)	Dimensions (cm) LxWxH or LxDia	Stowage Responsiblity		Stowage Phase			Special Requirements
				Ex	PL	L	O	R	
TBD									

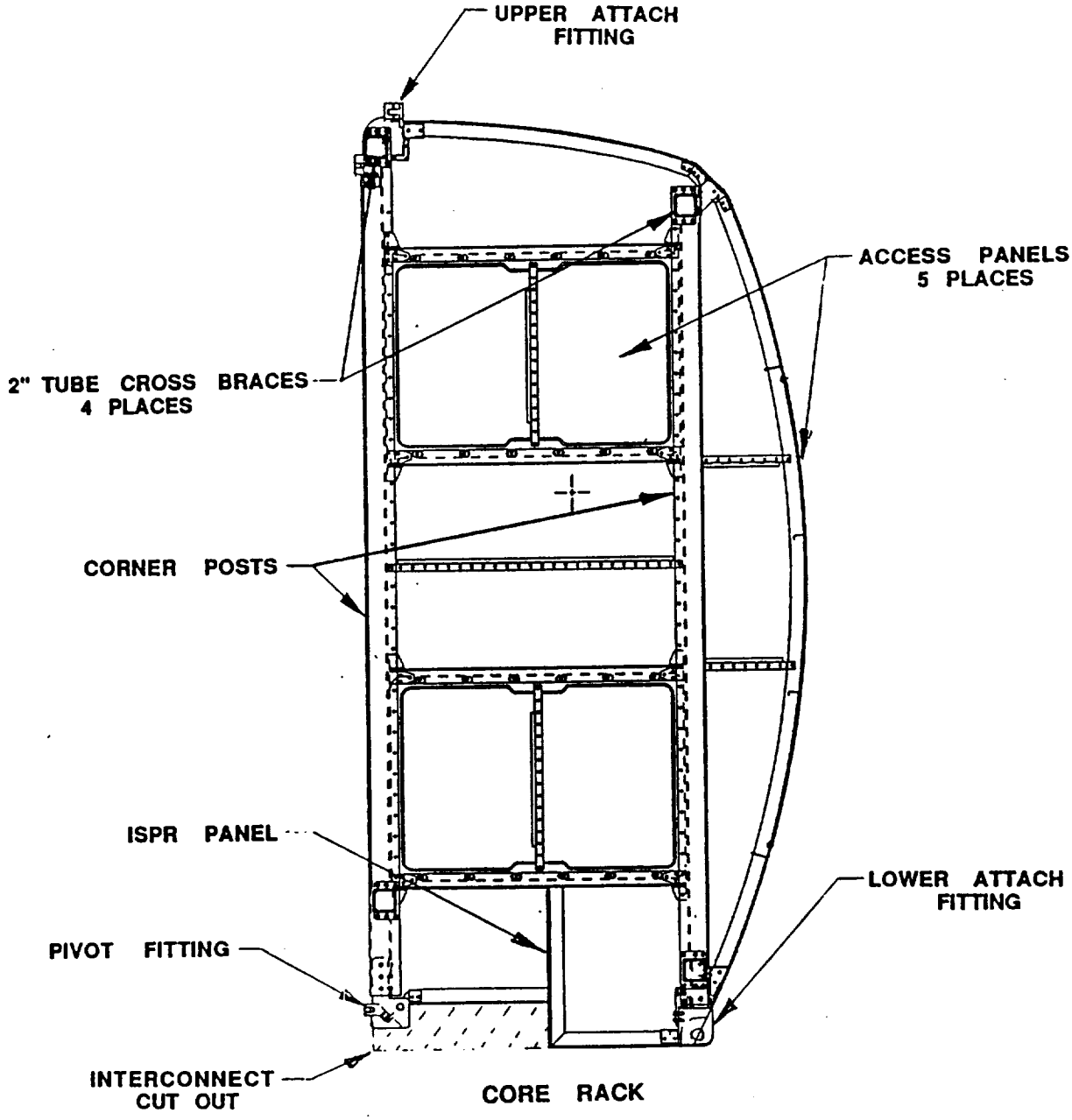


FIGURE 1.2-2. SSF TO SSFF CORE RACK PHYSICAL INTERFACE

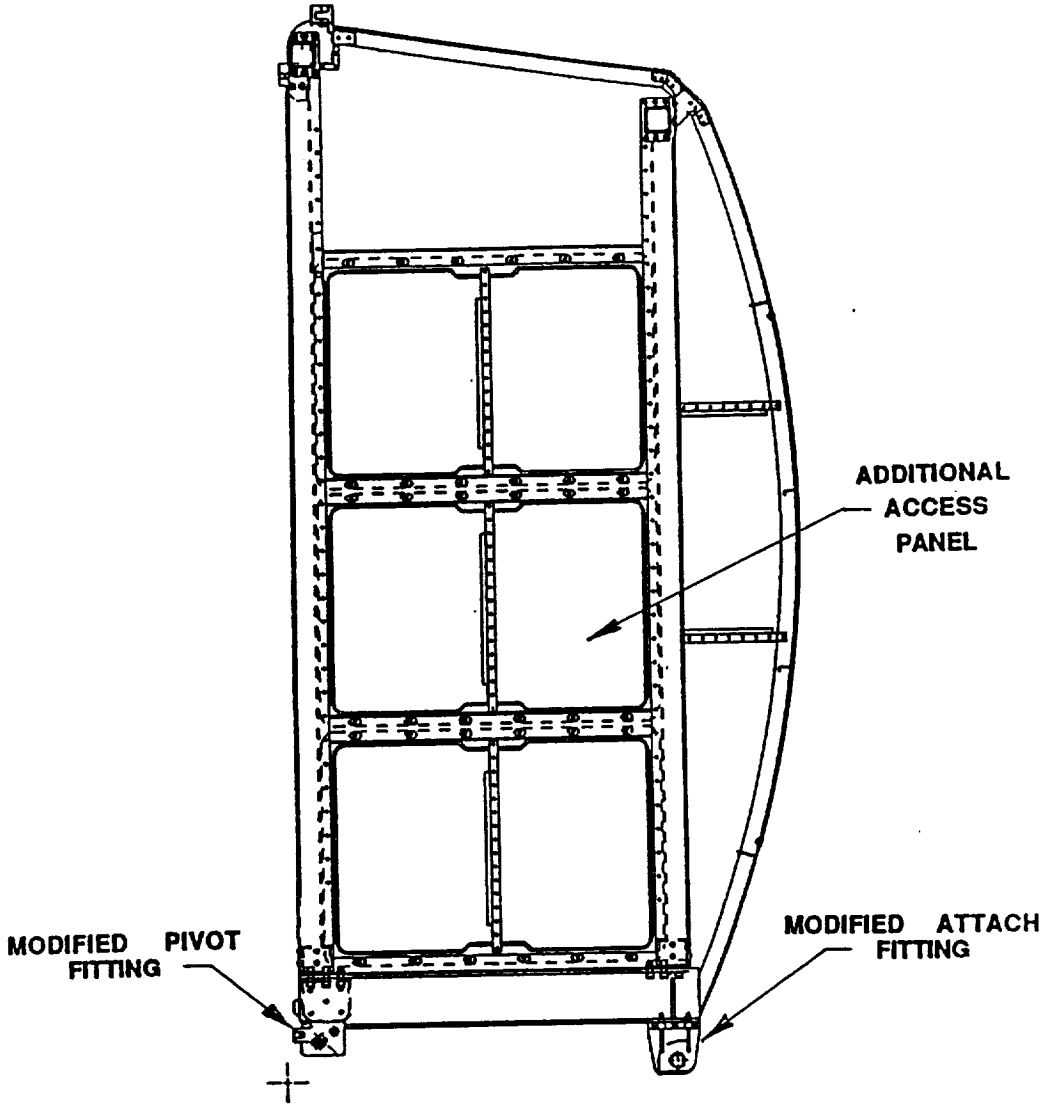


FIGURE 1.2-3. SSF TO SSFF EXPERIMENT RACK-1 PHYSICAL INTERFACE

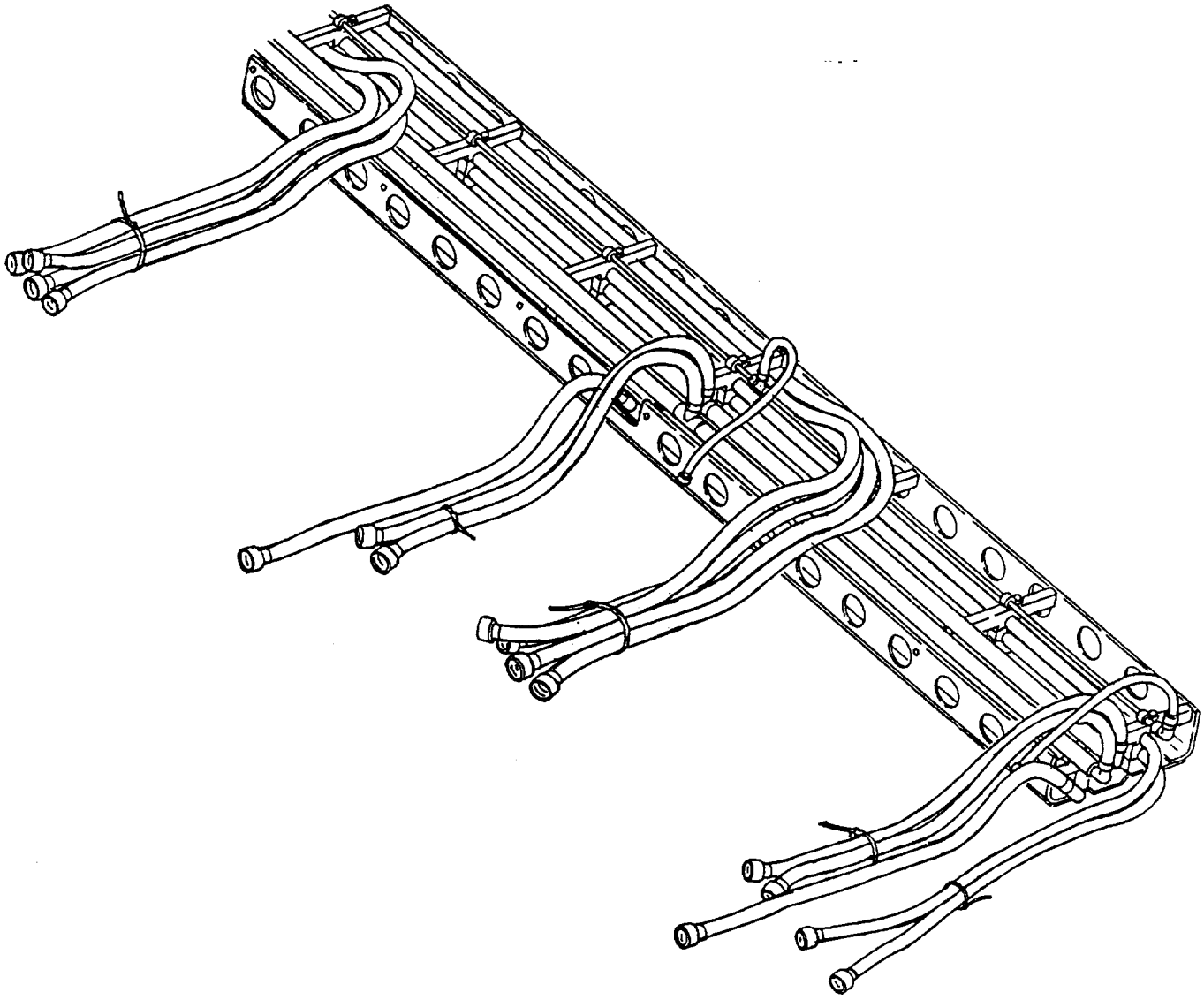


FIGURE 1.2-4. SSFF INTERCONNECT TRAY ASSEMBLY

1.2.2.2 SSF-to-SSFF Core Rack Interface

The SSFF will interface with SSF services in the standoff through an ISPR passthrough rack panel in the Core Rack. Figure 1.2-5 shows this Core Rack panel layout. SSFF subsystems receive the SSF services at the Core Rack, and then those services are routed out to Experiment Rack-1. All SSF services are provided at the Core Rack except avionics air and fire detection and suppression, which are provided at each rack location. Subsystem interfaces with SSF are described below.

1.2.2.2.1 SSF EPS-to-SSFF Core Rack - The SSFF Power Conditioning and Distribution Subsystem (PCDS) will interface with the SSF EPS by connecting to two 6-kW, 120-Vdc power buses in the Core Rack.

1.2.2.2.2 SSF DMS-to-SSFF Core Rack - The SSFF DMS will interface with the SSF DMS by connecting to the MIL-STD-1553 bus or the payload fiber distributed data interface (FDDI) at the Core Rack panel. The SSFF DMS will also require a high-rate data link (HRDL) interface at the Core Rack panel to accommodate transfer of high-rate data.

1.2.2.2.3 SSF TCS-to-SSFF Core Rack - The SSFF TCS will interface with the SSF TCS by connecting to the moderate temperature cooling loop with hoses from a payload rack heat exchanger behind the Core Rack panel.

1.2.2.2.4 SSF VES-to-SSFF Core Rack - The SSFF Gas Distribution Subsystem (GDS) will interface with the SSF VES by connecting a vacuum line at the Core Rack panel.

1.2.2.2.5 SSF LNS-to-SSFF Core Rack - The SSFF GDS will interface with the SSF LNS by connecting a nitrogen line at the Core Rack panel.

1.2.2.3 SSF-to-SSFF Experiment Rack-1 Interface

The only services provided directly from SSF to Experiment Rack-1 are avionics air and fire detection and suppression. The SSF will interface with SSFF Experiment Rack-1 at the furnace interface panel as shown in Figure 1.2-6. An SSFF-provided hose assembly will connect between this panel and the standoff interface service connection. All other Experiment Rack-1 services will be provided by the SSFF Core Rack.

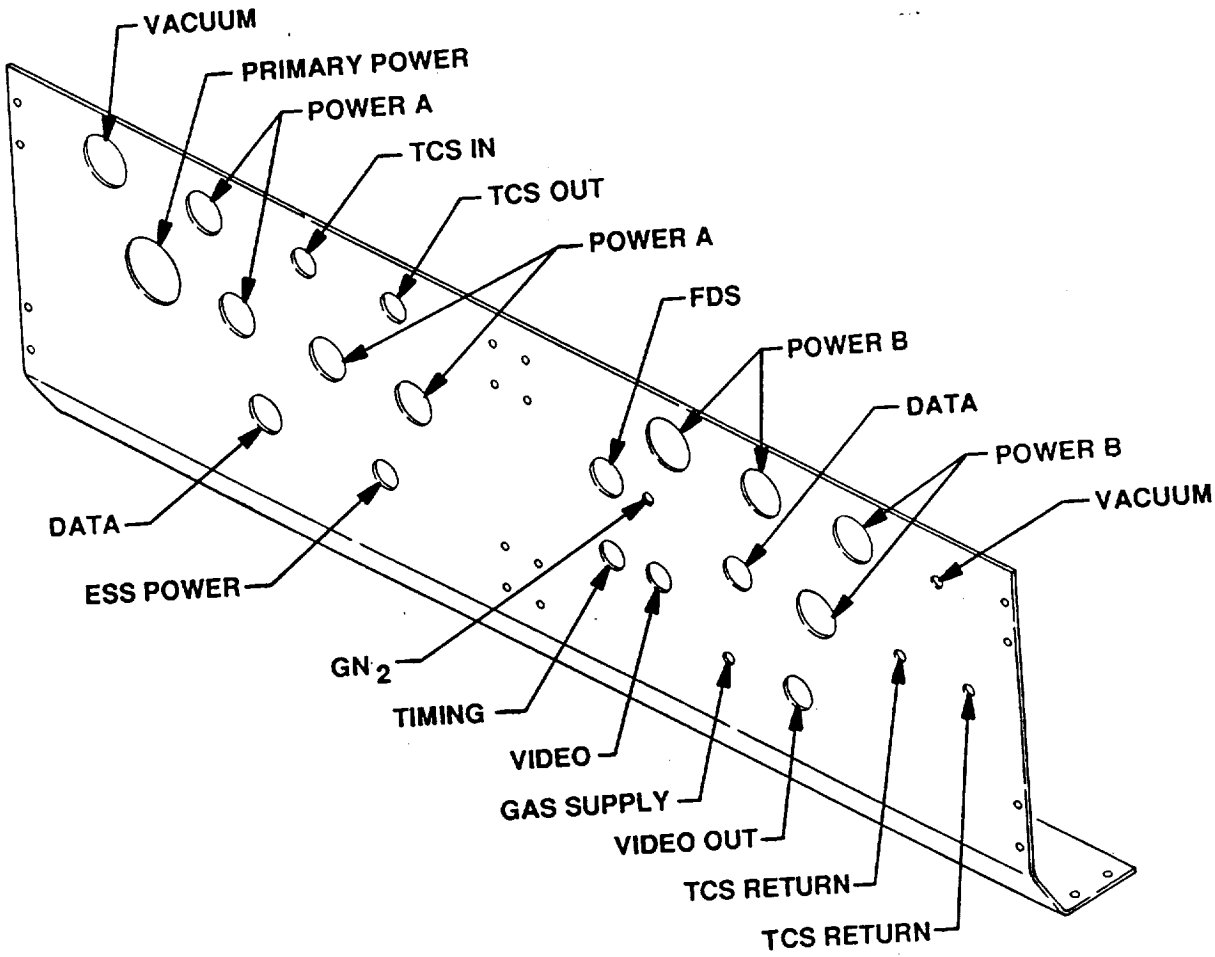


FIGURE 1.2-5. CORE RACK PANEL LAYOUT

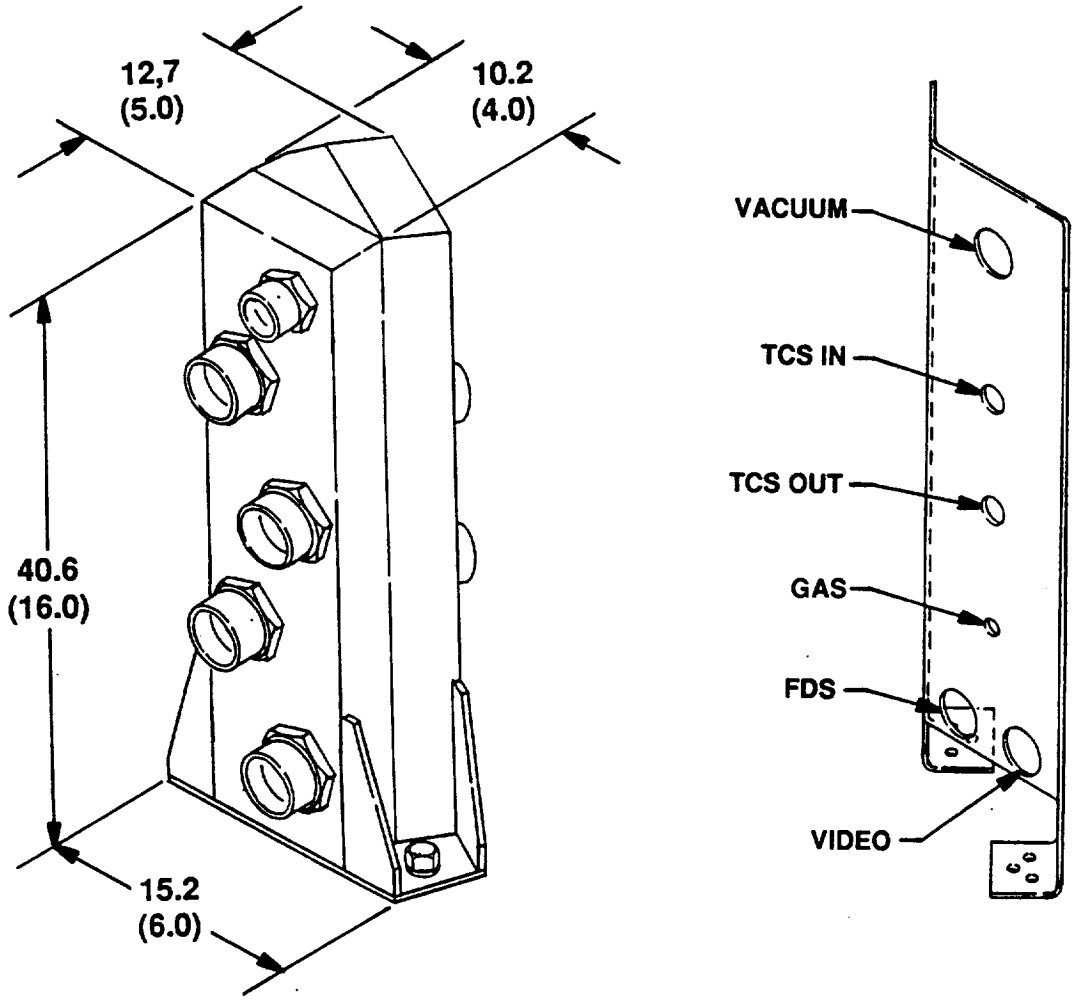


FIGURE 1.2-6. EXPERIMENT RACK-1 PANEL LAYOUTS

1.2.2.4 Crew Interface

A keyboard and display interface will be provided for crew interaction at the Core Rack. This system will have a standard QWERTY-type keyboard which can accept crew input commands for operation or configuration of the SSFF subsystems as required. Experiment sample exchanges will also require crew interface at Furnace Module-1, and opening and closing of manual valves will require crew interface at both rack locations.

1.3. POINTING/STABILIZATION AND ALIGNMENT

The Space Station Furnace Facility (SSFF) is required to provide for the alignment of the axis of selected solidification modules to within 5° of the residual g-vector. An acceleration of approximately 1.8 by 10^{-6} g_o is required to prevent a 100-μm particle from moving 1 diameter in 1000 sec.

The allowable acceleration level requirements are as follows for a 1-cm diameter sample:

1. $g \leq 1.0 \times 10^{-6} g_o$ for $0 \leq f \leq 0.020$ for periods up to 90 days
2. $g \leq 1.0 \times 10^{-6} g_o \times \frac{(f)}{0.020\ Hz}$ for $f \geq 0.020$ along residual g-vector
3. $g' \leq 1.6 \times 10^{-7} g_o \times \frac{(f)}{0.020\ Hz}$ for $f \geq 0.012$ along any axis perpendicular to the residual g-vector

where,

- g = Acceleration level within the experimental sample fluid (melt, solution, or vapor) and at the solidification/fluid interface.
- go = Acceleration at sea level on Earth.
- g' = Acceleration level perpendicular to direction of solidification front or desired fluid motion.
- f = Frequency of periodic accelerations in hertz.

Furnace Module-1 requires that there shall be 1-mm maximum lateral displacement between sample and furnace centerlines at any point along centerlines at any time during processing. This does not include any contribution from the sample's being not straight or out of round. It does include heater assembly and translation system contributions.

1.4. ORBITAL REQUIREMENTS AND CONSTRAINTS

TBD

1.5. ELECTRICAL REQUIREMENTS

The Space Station Furnace Facility (SSFF) Power Conditioning and Distribution Subsystem (PCDS) is composed of the equipment necessary to condition and distribute power provided by the Space Station Freedom (SSF) Electrical Power System (EPS) to SSFF subsystems. Figure 1.5-1 shows the PCDS block diagram. The SSFF PCDS will interface with the SSF by connecting to two 6-kW, 120-Vdc power buses. Since 3- and 6-kW SSF payload racks use one bus as a primary feed and the other as an essential feed, 12-kW racks are required to maintain 1 MΩ of electrical isolation between the two buses at all times (SSF Electric Power Specifications and Standards, SSP 30482). No true essentials bus exists at this time, only the two main buses. This means that a 12-kW rack must tie the two buses together whenever backup essentials power will be required. The two SSFF power buses (Bus A and Bus B) will feed the PCDS via SSF-provided Remote Power Distribution Assemblies (RPDAs) or through an SSFF-designed assembly (similar in function).

The bulk of the power to be distributed by the PCDS will be consumed by the Furnace Module-1 heaters with the remainder serving as housekeeping power to the SSFF subsystems. The Integrated Configuration-1 (IC1) configuration of the SSFF will require maximum peak power from the SSF of 4.6 kW. The operational power profile defining the use of the SSF-provided power by the SSFF during each functional objective (FO) is shown in Figure 1.5-2. The power profile data given here represent power requirement estimates to cover any of the the SSFF-accommodated Furnace Module-1 needs. The power levels defined in Figure 1.5-2 are considered maximums. Time duration for peak power requirements is 72 h. The average power required is 2.7 kW. The total energy requirement is 3800 kWh.

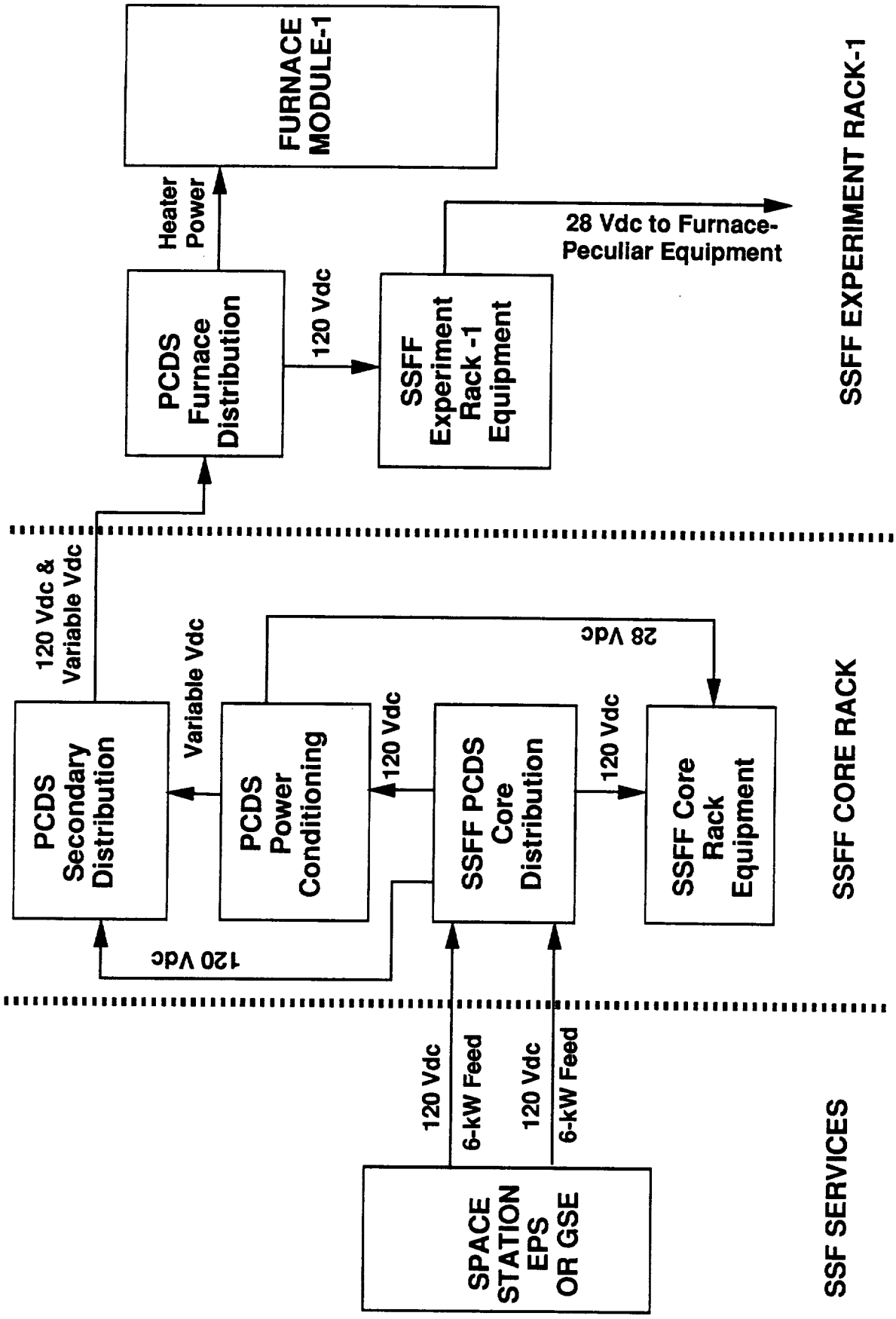
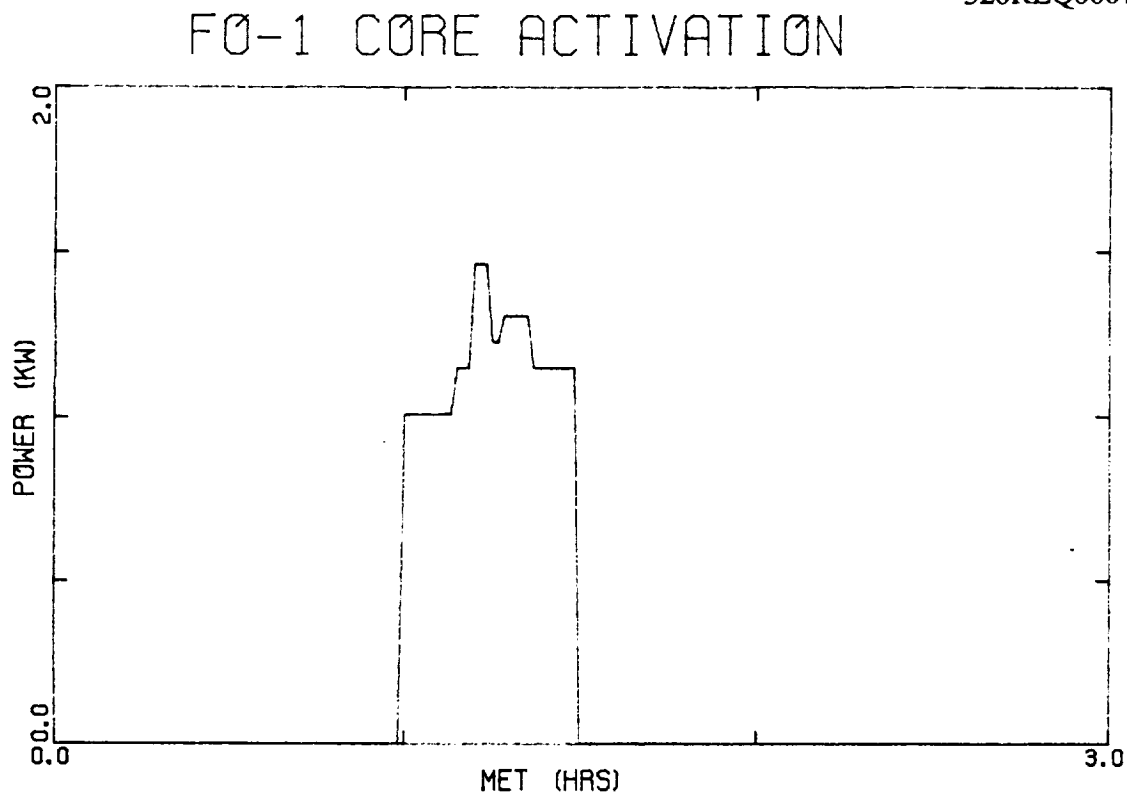


FIGURE 1.5-1. PCDS INTERFACE BLOCK DIAGRAM

C-2



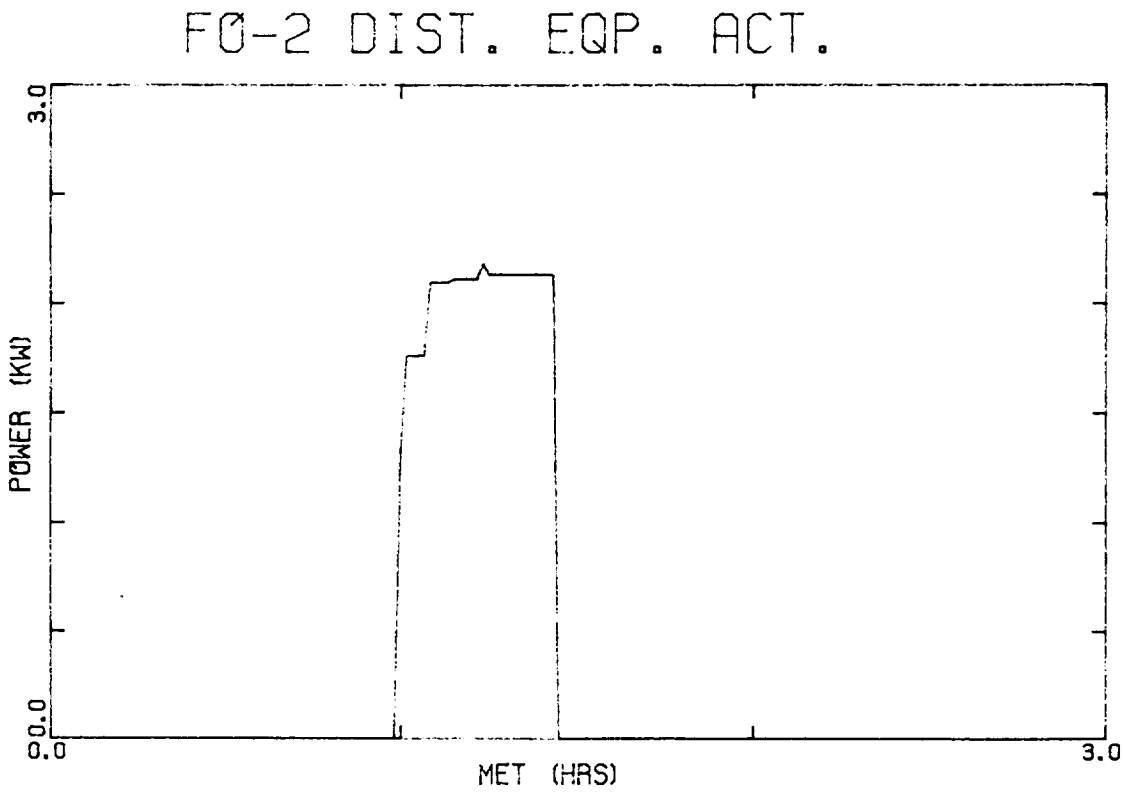
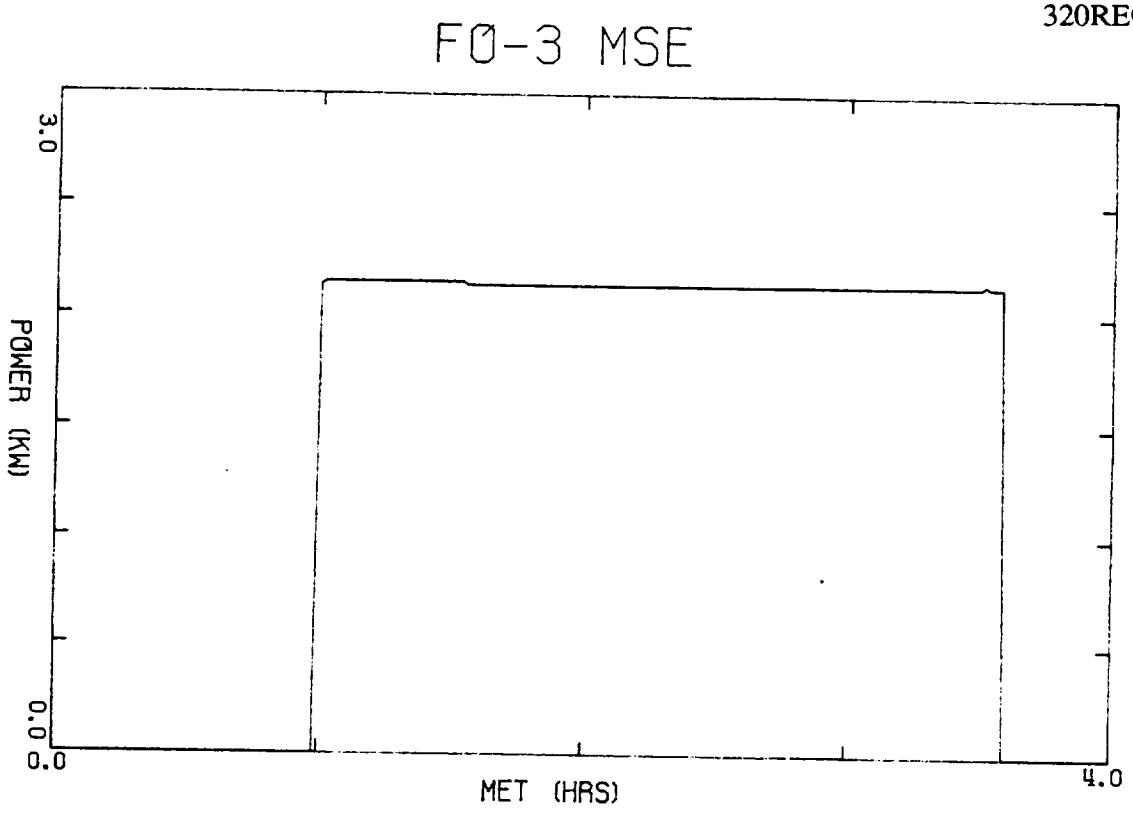


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 1 of 6)



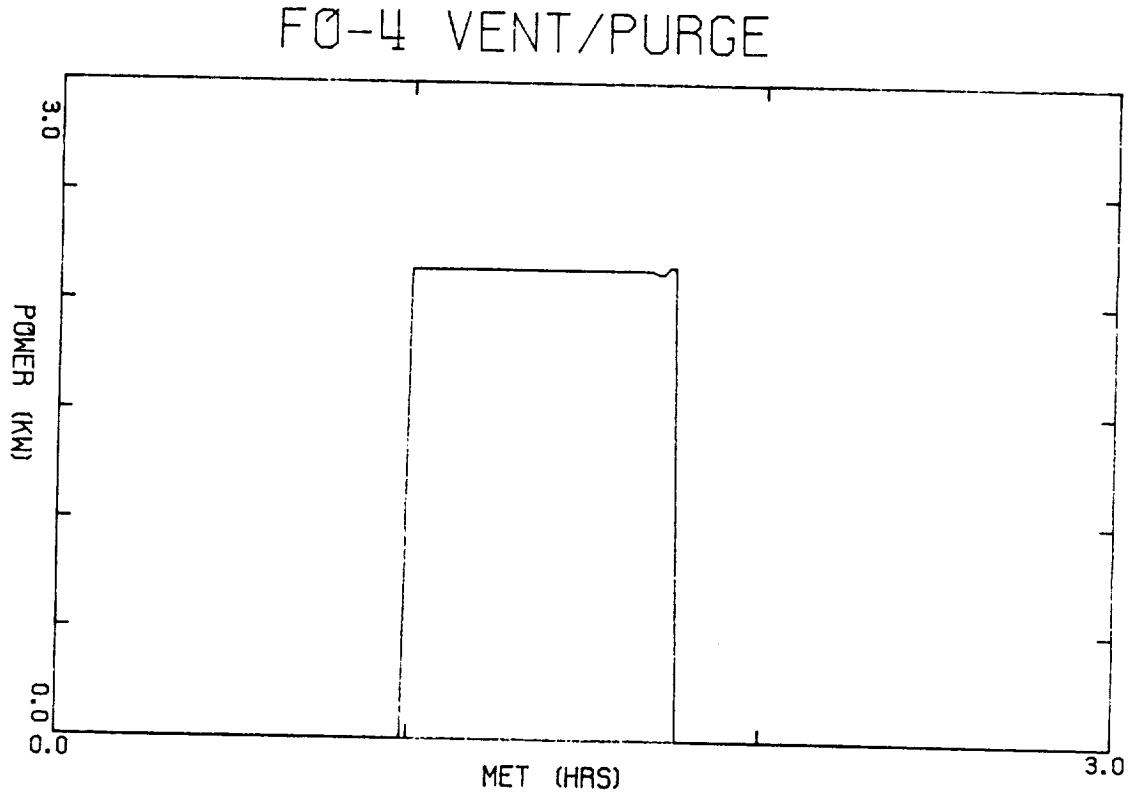
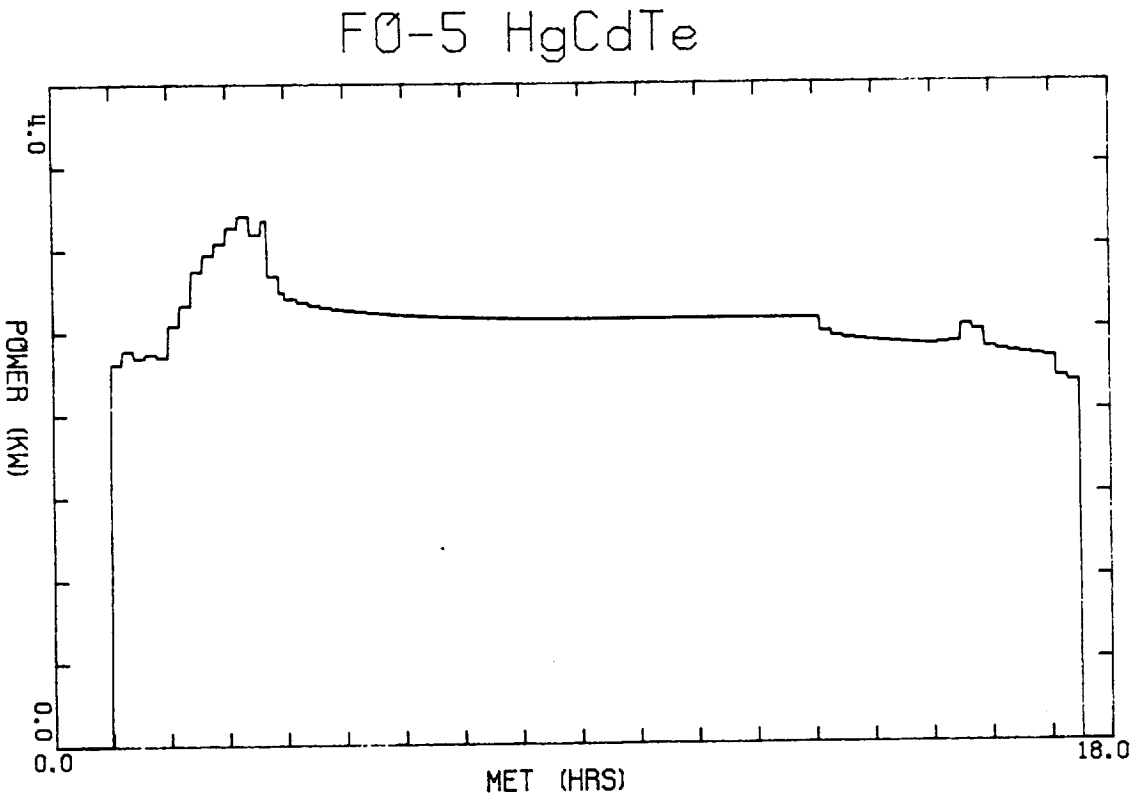


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 2 of 6)



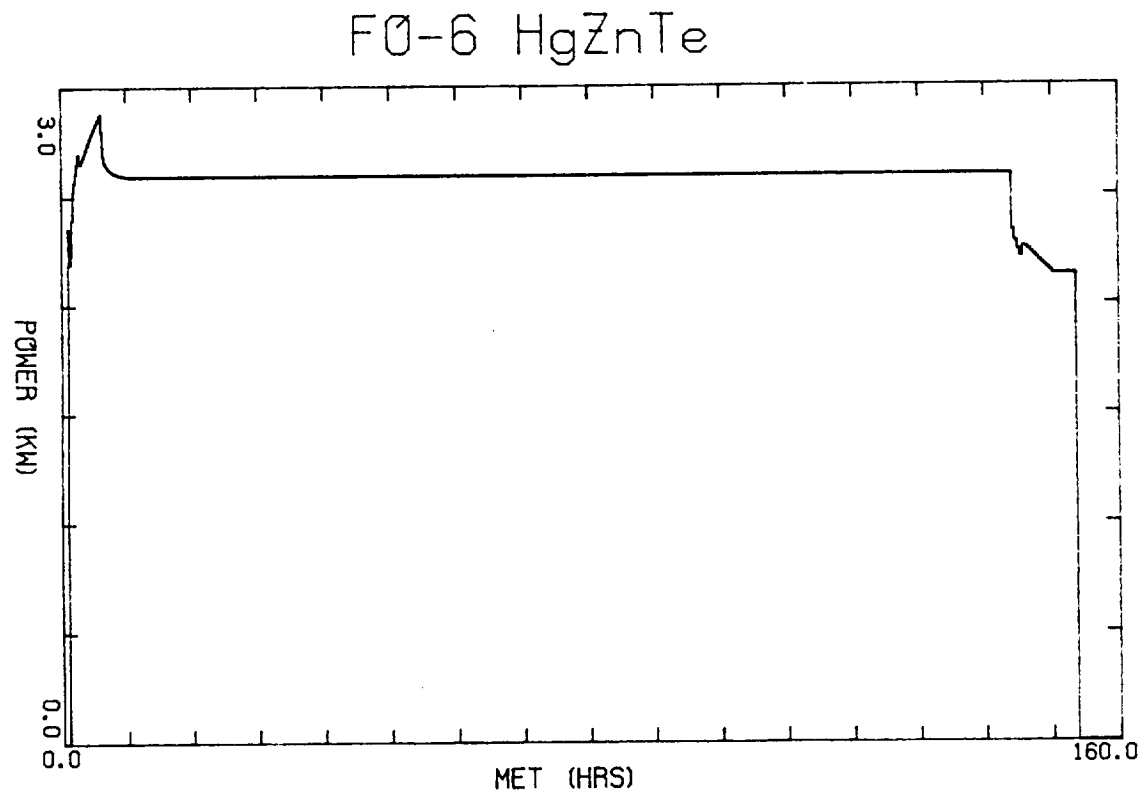
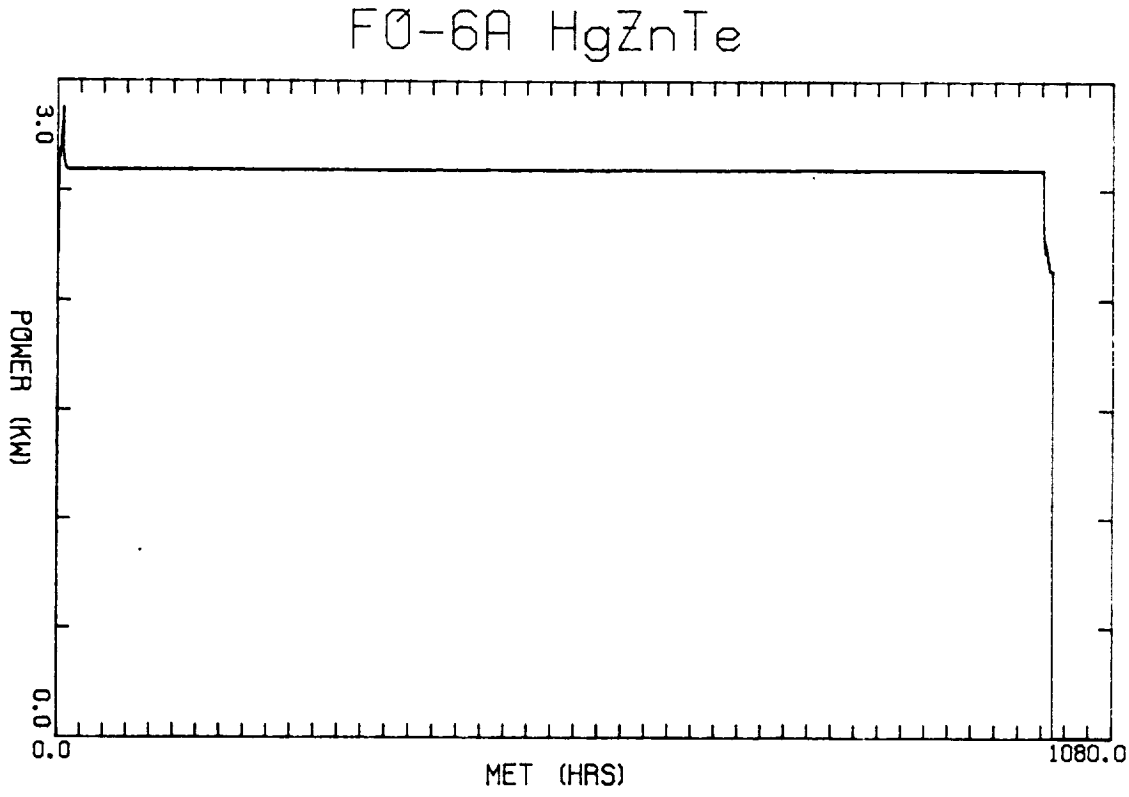


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 3 of 6)



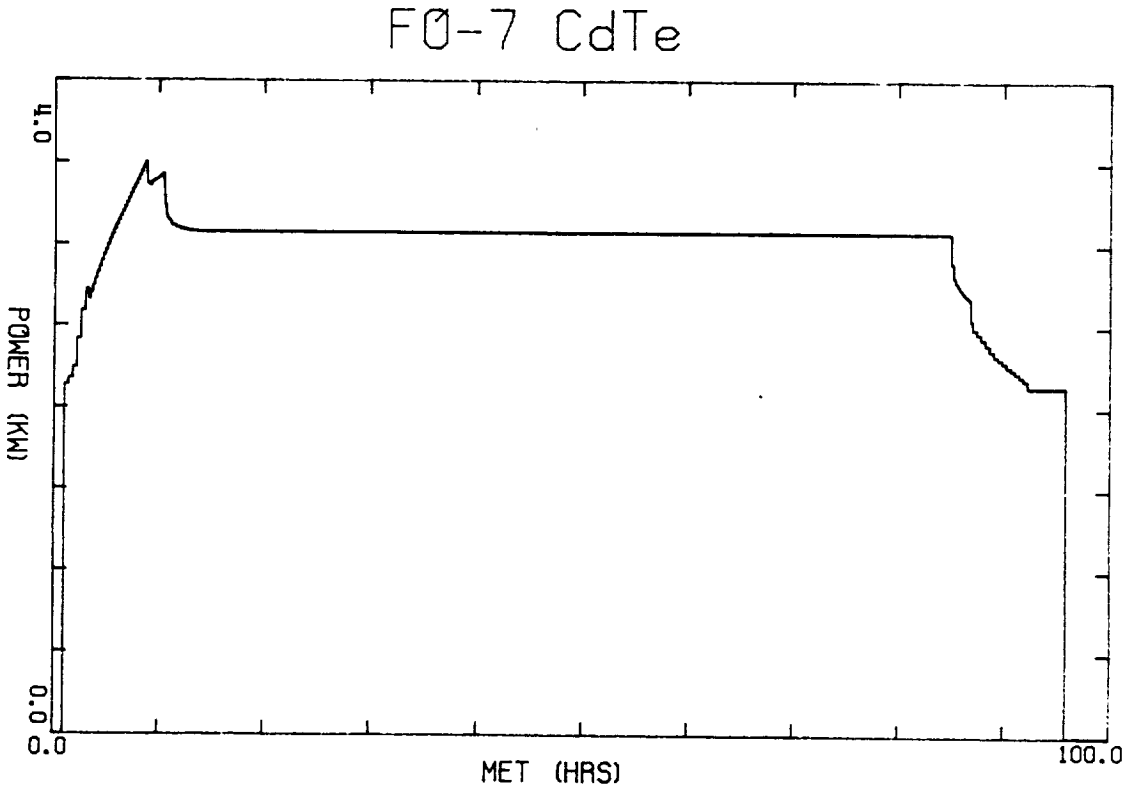
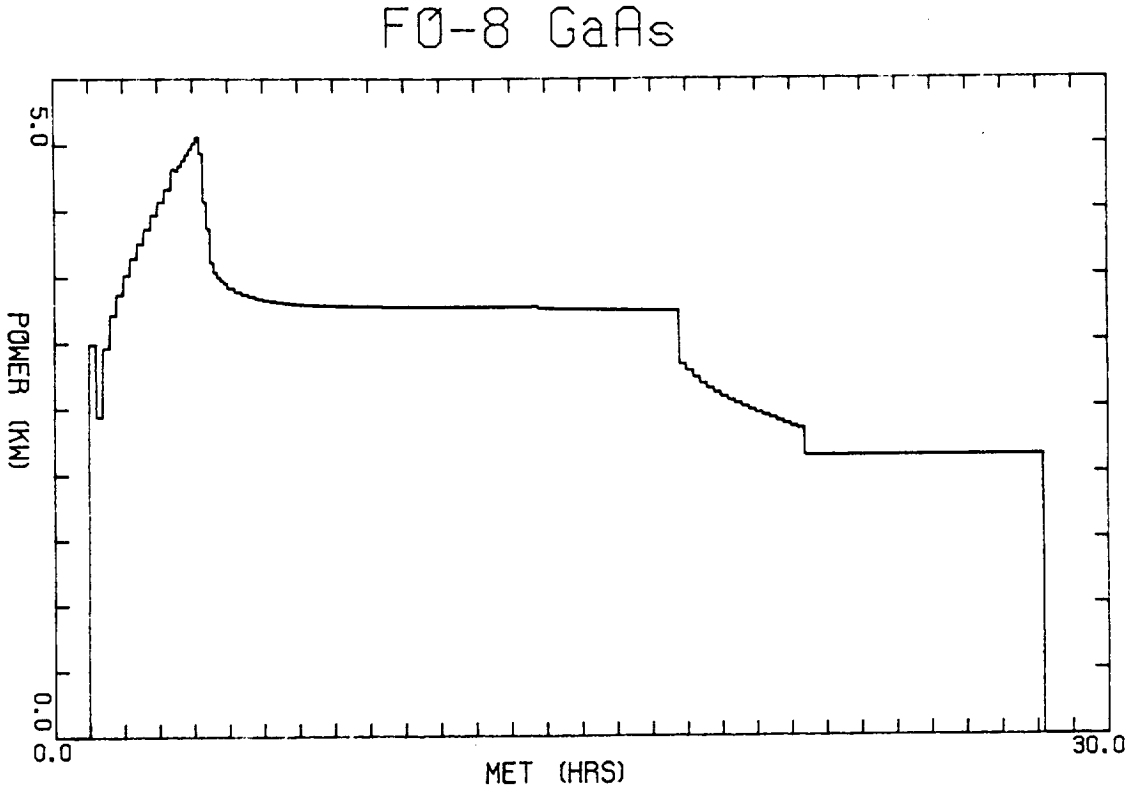


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 4 of 6)



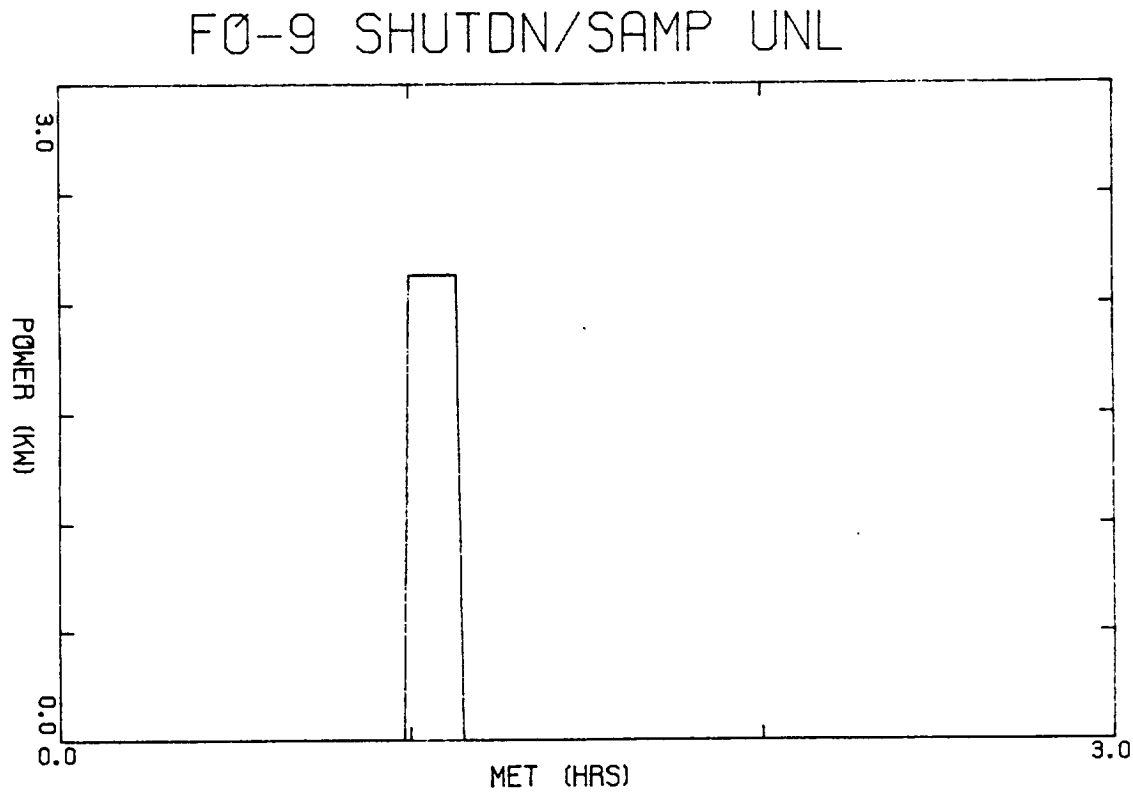


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 5 of 6)

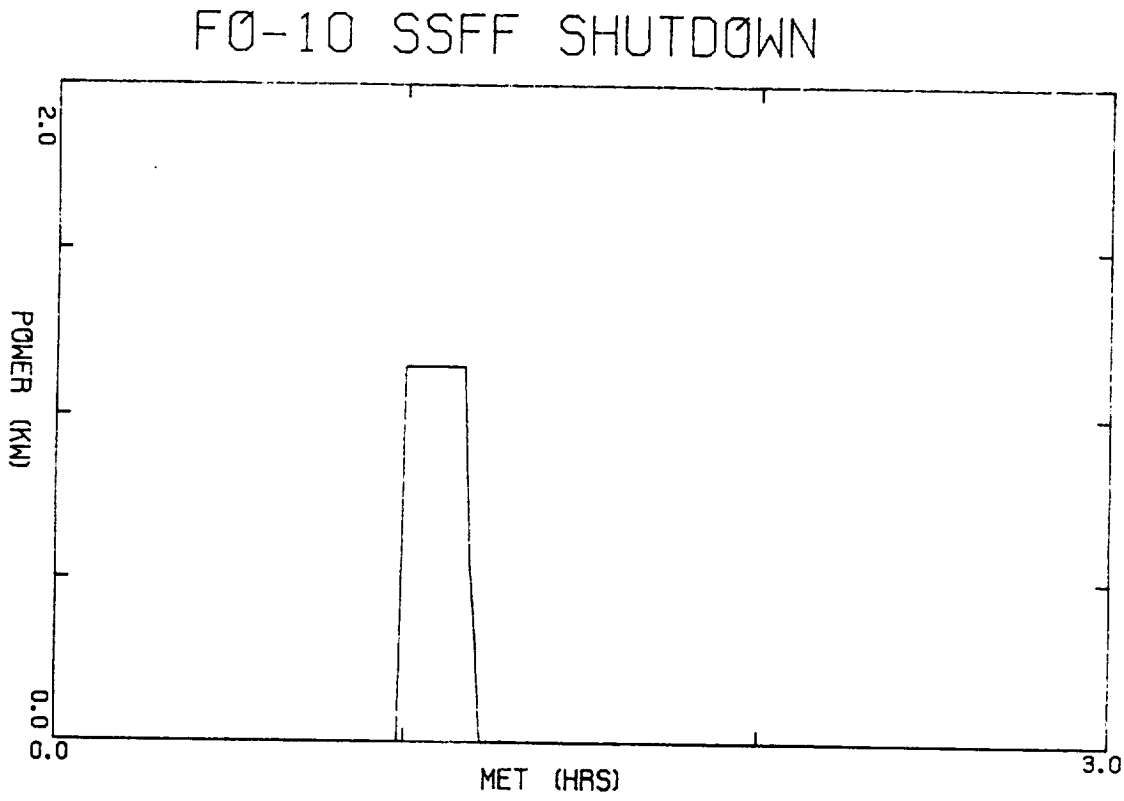


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 6 of 6)

1.6. THERMAL/FLUID REQUIREMENTS

1.6.1 HEAT TRANSFER CHARACTERISTICS

The Space Station Furnace Facility (SSFF) Thermal Control System (TCS) water cooling loop will collect heat from Furnace Module-1 and the Core Rack electronics. The collected heat will then be transferred to the Space Station Freedom (SSF) TCS moderate temperature loop via the Core Rack heat exchanger. Figure 1.6-1 shows the TCS block diagram. On-orbit thermal requirements of the SSFF are shown in Table 1.6-1.

The SSFF TCS water cooling loop collects heat from the furnace modules and subsystem electronics. The collected heat is then transferred to the SSF TCS via the Core Rack heat exchanger. Total maximum heat dissipation of the Integrated Configuration-1 (IC1) configuration of SSFF to the SSF TCS is 4518 W.

Avionics air will be required to cool some SSFF subsystem equipment in both racks. Total maximum heat dissipation to avionics air is 371 W in the Core Rack and 366 W in Experiment Rack-1.

1.6.2 FLUID/VENT REQUIREMENTS

The Gas Distribution Subsystem (GDS) provides the distribution of SSF-provided gases and vacuum to Furnace Module-1. It also provides contamination monitoring of waste gases and gaseous argon to Furnace Module-1. The GDS block diagram is shown in Figure 1.6-2.

The IC1 configuration of the SSFF GDS will require 10.4 kg of SSF-provided dry nitrogen at the Core Rack per 90-day mission, supplied at 618 to 756 kPa (90 to 110 psia). This will be regulated down internally in the core to approximately 137 to 240 kPa (20 to 35 psia) for safe pressurization of the furnace enclosures. The GDS will also require the SSF-provided vacuum at the Core Rack, which furnishes the furnace modules access to the 1×10^{-3} torr vacuum line.

Gas and vacuum requirements for the IC1 configuration of SSFF are shown in Table 1.6-2.

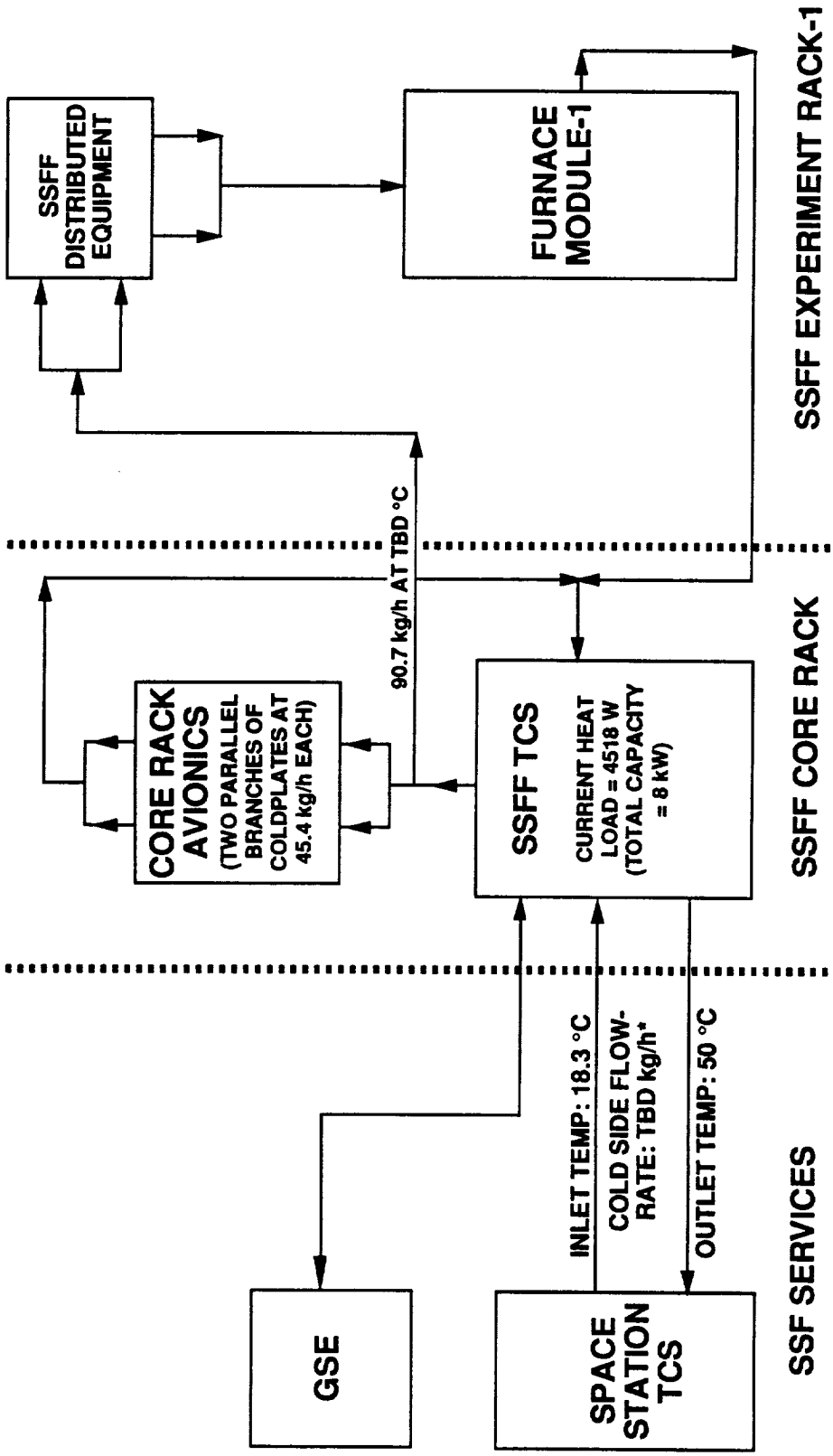


FIGURE 1.6-1. TCS INTERFACE BLOCK DIAGRAM

TABLE 1.6-1. ON-ORBIT THERMAL REQUIREMENTS (Sheet 1 of 2)

Equipment Item and FO No.	Heat-Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal Capacitance (W-h-°C)	Special Considerations (as applicable)
	Cabin	Av. Air (nonducted)	Av. Air (ducted)	Exp CP (SSFF)	Exp. HX	Standby	Operate	Peak* or other	Standby	Operate	Non-Operate		
FO-1		X					134	200		17/43		TBD	
FO-1				X			1053	1327		18/50		TBD	
FO-2		X					310	391		17/43		TBD	
FO-2				X			1653	1817		18/50		TBD	
FO-3		X					323	332		17/43		TBD	
FO-3				X			1817	1817		18/50		TBD	
FO-4		X					332	347		17/43		TBD	
FO-4				X			1817	1817		18/50		TBD	
FO-5		X					317	317		17/43		TBD	
FO-5				X			1817	1817		18/50		TBD	
FO-5					X		232	270		TBD		TBD	
FO-6		X					317	317		17/43		TBD	
FO-6				X			1817	1817		18/50		TBD	
FO-6					X		283	285		TBD		TBD	
FO-6A		X					317	317		17/43		TBD	
FO-6A				X			1817	1817		18/50		TBD	
FO-6A					X		283	285		TBD		TBD	
FO-7		X					317	317		17/43		TBD	
FO-7				X			1817	1817		18/50		TBD	
FO-7					X		525	580		TBD		TBD	
FO-8		X					317	317		17/43		TBD	
FO-8				X			1817	1817		18/50		TBD	
FO-8					X		524	697		TBD		TBD	

TABLE 1.6-1. ON-ORBIT THERMAL REQUIREMENTS (Sheet 2 of 2)

Equipment Item and FO No.	Heat-Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal Capacitance (W-h-°C)	Special Considerations (as applicable)
	Cabin	Av. Air (nonducted)	Av. Air (ducted)	Exp CP (SSFF)	Exp. HX	Standby	Operate	Peak* or other	Standby	Operate	Non-Operate		
FO-9		X					317	317		17/43		TBD	
FO-9					X		1817	1817		18/50		TBD	
FO-10		X					44	121		17/43		TBD	
FO-10					X		465	1026		18/50		TBD	
FO-11		X					317	317		17/43		TBD	
FO-11					X		2000	2016		18/50		TBD	

* Each FO contains multiple steps; therefore, peak water-cooled load and peak avionics air load may not occur on the same step.

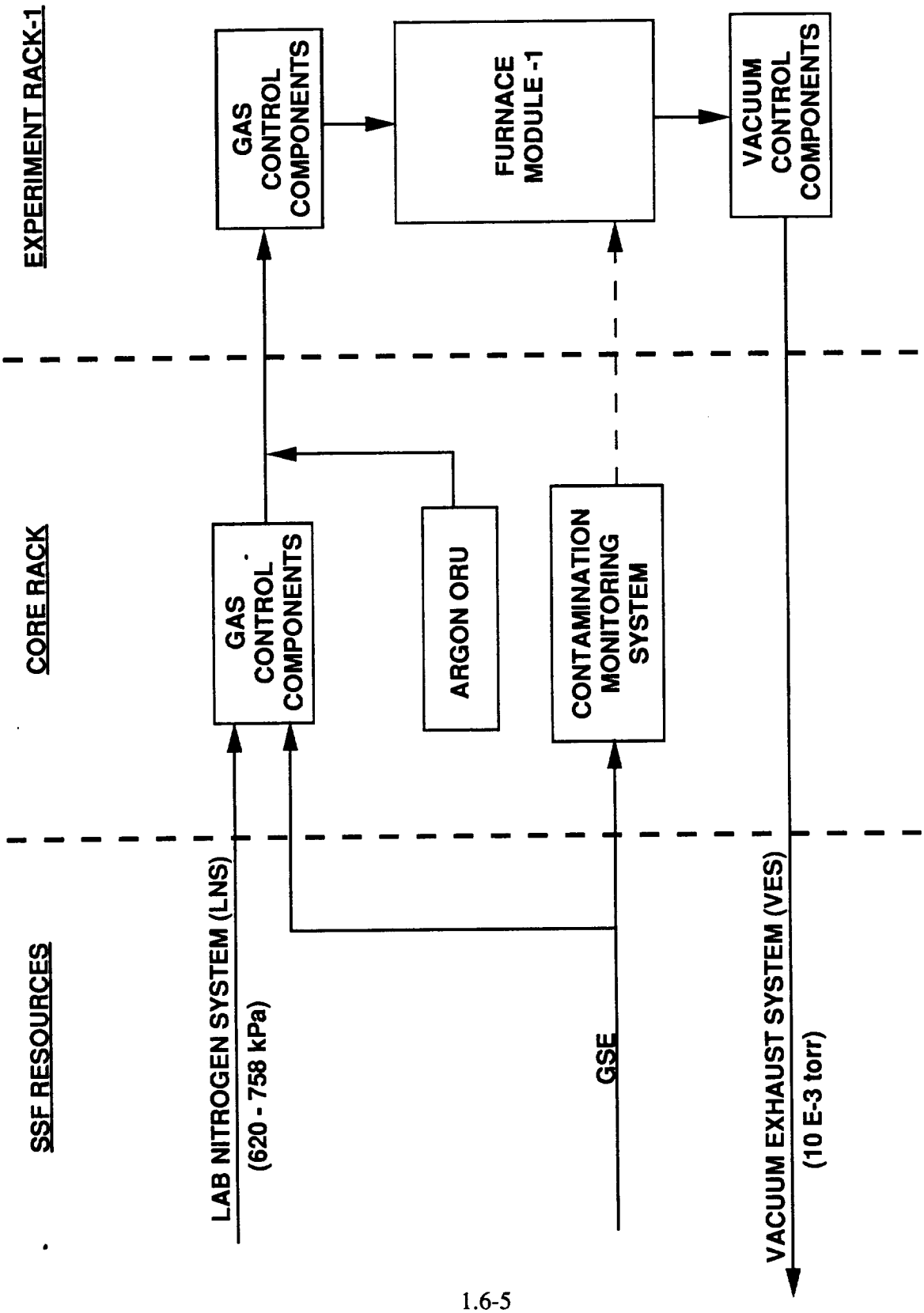


FIGURE 1.6-2. GDS INTERFACE BLOCK DIAGRAM

TABLE 1.6-2. FLUID REQUIREMENTS

Equipment Item and FO No.	Functional Requirement (Pressure, Purge, Vent Vacuum)	Gas or Liquid Parameters					Vent		Vacuum Vent Rate: torr-l/sec	Special Considerations (as applicable)
		Type	Quantity Stored (kg)	Pressure Limits (N/m2)	Flow-rate (kg/h)	Pressure Drop (N/m2)	Pressure (Pa)	When Required and Duration		
FO-1	N/A									
FO-2	N/A									
FO-3	Purge/vent	GN_2	1.4 (supp. by SSF)	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-4	N_2 purge/vent	GN_2	1.4	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-4	Ar purge/vent	Ar	1.9	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-5	N/A									
FO-6	N/A									
FO-6A	N/A									
FO-7	N/A									
FO-8	N/A									
FO-9	Vent						0.133	TBD	1.2×10^{-3}	
FO-10	N/A									
FO-11	N/A									

1.7. DATA SYSTEM REQUIREMENTS

This section describes the Space Station Furnace Facility (SSFF) Data Management System (DMS) and the data system requirements of the SSFF to Space Station Freedom (SSF). The SSFF DMS contains the electronics for control and monitoring of subsystems associated with SSFF Core and Furnace Module-1 operations, including the Thermal Control Subsystem (TCS), the Power Conditioning and Distribution Subsystem (PCDS), and the Gas Distribution Subsystem (GDS). In addition to these subsystem tasks, the DMS also monitors and controls the unique functions of Furnace Module-1 including closed loop control of heater temperatures via thermocouple inputs (and other sensors), sensing and control of furnace translation (i.e., movement of the relative sample position to the hot/cold zones), and sensing and control of the Furnace Module-1 actuators and effectors. The DMS provides a communications media for the facility, stores digitized experiment data, and provides an interface to the SSF DMS. The SSFF DMS, as shown in Figure 1.7-1, consists of the Core and distributed components. Subsections 1.7.1 through 1.7.5 and Tables 1.7-1 through 1.7-5 define the DMS interface data and resource requirements of the SSFF.

1.7.1 SIGNAL INTERFACE DEFINITION

Table 1.7-1 defines the following data signals and control:

- Onboard and uplink commands to the SSFF and SSFF Furnace Module-1
- Routing of SSFF Core housekeeping data
- Routing of Furnace Module-1 housekeeping data
- Routing of Furnace Module-1 science data

1.7.2 SIGNAL INTERFACE DEFINITION EXPANSION

Table 1.7-2 is an expansion of the data from Table 1.7-1.

1.7.3 EVENT/EXCEPTION MONITORING REQUIREMENTS

Onboard event and exception monitoring requirements for SSFF and Furnace Module-1 are defined in Table 1.7-3.

1.7.4 PAYLOAD OPERATIONS INTEGRATION CENTER DISPLAY REQUIREMENTS

The Payload Operations Integration Center (POIC) controls all payload operations and is equipped with consoles for data management, operations control, and mission planning. The data to provide this capability are shown in Table 1.7-4.

1.7.5 POIC LIMIT SENSING/EXCEPTION MONITORING REQUIREMENTS

Limit sensing and exception monitoring is provided to the POIC via downlink and is defined in Table 1.7-5.

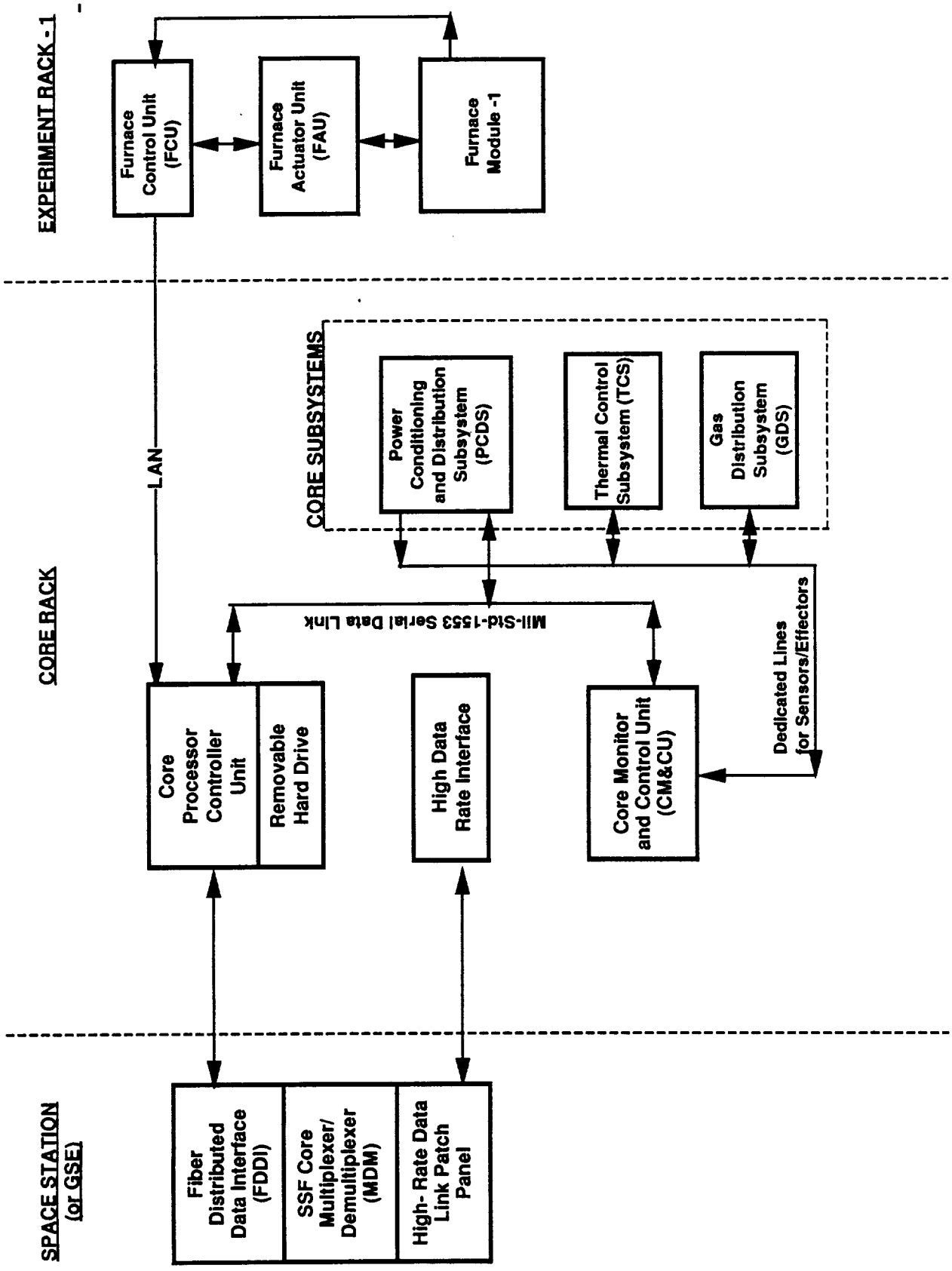


FIGURE 1.7-1. DMS INTERFACE BLOCK DIAGRAM

TABLE 1.7-1. SIGNAL INTERFACE DEFINITION

ENT NO.	DESCRIPTION	C M D K	S I G L	D E F K	I N T A	N O . C	SER.DATA NM OS .F	NW OO .G FS	S O R X	T E P	E C T	L A M	A A P	R T E	RESERVED
106	FURNACE MODULE HOUSEKEEPING DATA		SI		1	3	32	N				1			
107	SSFF HOUSEKEEPING DATA		SI		1	3	32	N				1			
850	FURNACE SCIENCE DATA		SI		1	3	32	N				1			
851	FURNACE SCIENCE DATA		SI		1	3	32	N				1			
900	SSF CMDS & S/W PATCHES TO SSFF	Y	SO		1			N				1			

1 2 3 4 5 6 7 8
123 456789012345678901234567890123456 789 012 34 56 7 8 9 0 1 234 567 890 123 4 567 890 1 23 4567 89 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 1 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D /	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
001	107		SSFF HOUSEKEEPING DATA		SS															41	2
200	106		Go/NoGo Error Override		DI	01		B	00	00	00	00					Y		3330	41	2
201	106		Process Elapsed Time - Seconds		DG	01	06	U	00	01	00	06					Y		3331	41	2
202	106		CGF Sytstem State		DG	01	03	U	00	07	00	09					Y		3332	41	2
203	106		Sample Number (Mode)		DG	01	06	U	00	10	00	15					Y		3333	41	2
204	106		Process Elapsed Time - Hours		DG	01	10	U	01	00	01	09					Y		3334	41	2
205	106		Process Elapsed Time - Minutes		DG	01	06	U	01	10	01	15					Y		3335	41	2
207	106		IFEA Water Outlet Temp		AI	01		S	03	00	03	07			Y	Y	Y		3336	41	2
208	106		IFEA Lower Humidity		AI	01		S	04	00	04	07			Y	Y	Y		3337	41	2
209	106		IFEA Upper Humidity		AI	01		S	05	00	05	07			Y	Y	Y		3338	41	2
210	106		IFEA Upper Atmosphere Temp		AI	01		S	12	00	12	07			Y	Y	Y		3355	41	2
211	106		RFM Cold End Shell Temp		AI	01		S	13	00	13	07			Y	Y	Y		3356	41	2
212	106		RFM Hot End Shell Temp		AI	01		S	14	00	14	07			Y	Y	Y		3357	41	2
213	106		Ampoule Alignment Arm Temp		AI	01		S	15	00	15	07					Y		3358	41	2
214	106		SEM Track Temp		AI	01		S	16	00	16	07					Y		3359	41	2
215	106		IFEA Absolute Pressure 1		AI	01		S	17	00	17	07			Y	Y	Y		3360	41	2
216	106		IFEA Absolute Pressure 2		AI	01		S	18	00	18	07			Y	Y	Y		3361	41	2
217	106		Furnace Linear Position		AI	01		S	19	00	19	07					Y		3362	41	2
218	106		Indexing CAM Rotary Position		AI	01		S	20	00	20	07					Y		3363	41	2
219	106		Experiment Main Bus Current		AI	01		S	21	00	21	07			Y	Y	Y		3364	41	2
220	106		Experiment Main Bus Voltage		AI	01		S	22	00	22	07			Y	Y	Y		3365	41	2
221	106		Water Outlet Vlv RCCB Off Status		DI	01		B	23	00	23	00					Y		3250	41	2
222	106		Water Outlet Vlv RCCB On Status		DI	01		B	23	01	23	01					Y		3251	41	2
223	106		IFEA Coolant Flow #1 Status		DI	01		B	23	02	23	02			Y		Y		3366	41	2
224	106		IFEA Coolant Flow #2 Status		DI	01		B	23	03	23	03			Y		Y		3367	41	2
225	106		Vacuum Vent Vlv RCCB Off Status		DI	01		B	23	04	23	04					Y		3368	41	2
226	106		Vacuum Vent Vlv RCCB On Status		DI	01		B	23	05	23	05					Y		3369	41	2
227	106		Hot Boost Mod A RCCB Off Status		DI	01		B	23	06	23	06					Y		3370	41	2
228	106		Hot Boost Mod A RCCB On Status		DI	01		B	23	07	23	07					Y		3371	41	2
229	106		Hot Boost Mod B RCCB Off Status		DI	01		B	23	08	23	08					Y		3372	41	2
230	106		Hot Boost Mod B RCCB On Status		DI	01		B	23	09	23	09					Y		3373	41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 2 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT #	END WD #	END BT #	DATA VALUE T P	MON REQ E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
231	106		COLD Main Prim Mod RCCB Off Stat	DI	01			B	23	10	23	10					Y		3374	41	2
232	106		COLD Main Prim Mod RCCB On Stat	DI	01			B	23	11	23	11					Y		3375	41	2
233	106		HotMain Prim Mod A RCCB Off Stat	DI	01			B	23	12	23	12					Y		3376	41	2
234	106		HotMain Prim Mod A RCCB On Stat	DI	01			B	23	13	23	13					Y		3377	41	2
235	106		Water Inlet Valve RCCB Off Stat	DI	01			B	23	14	23	14					Y		3378	41	2
236	106		Water Inlet Valve RCCB On Status	DI	01			B	23	15	23	15					Y		3379	41	2
237	106		PDS Airflow 1 Status	DI	01			B	24	00	24	00			Y		Y		3380	41	2
238	106		SCS Airflow 1 Status	DI	01			B	24	01	24	01			Y		Y		3381	41	2
239	106		PCS Airflow 1 Status	DI	01			B	24	02	24	02			Y		Y		3382	41	2
240	106		PCS Airflow 2 Status	DI	01			B	24	03	24	03			Y		Y		3383	41	2
241	106		Argon Fill Valve RCCB Off Status	DI	01			B	24	04	24	04					Y		3384	41	2
242	106		Argon Fill Valve RCCB On Status	DI	01			B	24	05	24	05					Y		3385	41	2
243	106		PCS Utility RCCB Off Status	DI	01			B	24	06	24	06					Y		3386	41	2
244	106		PCS Utility RCCB On Status	DI	01			B	24	07	24	07					Y		3387	41	2
245	106		Peltier Conn Motor RCCB Off Stat	DI	01			B	24	08	24	08					Y		3388	41	2
246	106		Peltier Conn Motor RCCB On Stat	DI	01			B	24	09	24	09					Y		3389	41	2
247	106		Cold Main Red Mod RCCB Off Stat	DI	01			B	24	10	24	10					Y		3390	41	2
248	106		Cold Main Red Mod RCCB On Status	DI	01			B	24	11	24	11					Y		3391	41	2
249	106		Hot Main Prim Mod B RCCB Off Sta	DI	01			B	24	12	24	12					Y		3392	41	2
250	106		Hot Main Prim Mod B RCCB On Stat	DI	01			B	24	13	24	13					Y		3393	41	2
251	106		Hot Guard Module RCCB Off Status	DI	01			B	24	14	24	14					Y		3394	41	2
252	106		Hot Guard Module RCCB On Status	DI	01			B	24	15	24	15					Y		3395	41	2
253	106		Mech Pulsing Mod RCCB Off Status	DI	01			B	25	00	25	00					Y		3252	41	2
254	106		Mech Pulsing Mod RCCB On Status	DI	01			B	25	01	25	01					Y		3253	41	2
255	106		IFEA ABS Press 2 RCCB Off Status	DI	01			B	25	02	25	02					Y		3396	41	2
256	106		IFEA ABS Press 2 RCCB On Status	DI	01			B	25	03	25	03					Y		3397	41	2
257	106		IFEA ABS Press 1 RCCB Off Status	DI	01			B	25	04	25	04					Y		3398	41	2
258	106		IFEA ABS Press 1 RCCB On Status	DI	01			B	25	05	25	05					Y		3399	41	2
259	106		Vacuum Vent Valve Closed Status	DI	01			B	25	06	25	06					Y		3400	41	2
260	106		Vacuum Vent Valve Open Status	DI	01			B	25	07	25	07					Y		3401	41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 3 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D L K	U S A G E	MN SO G.	NM OS /G W D S /	S O X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	T Y P E	DATA VALUE	MON REQ E V N T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
261	106		Argon Fill Valve Closed Status	DI	01			B	25	08	25	08						Y		3402	41	2
262	106		Argon Fill Valve Open Status	DI	01			B	25	09	25	09						Y		3403	41	2
263	106		Hot Main Red Mod A RCCB Off Stat	DI	01			B	25	10	25	10						Y		3254	41	2
264	106		Hot Main Red Mod A RCCB On Stat	DI	01			B	25	11	25	11						Y		3255	41	2
265	106		Water Outlet Valve Normal Stat	DI	01			B	25	12	25	12			Y			Y		3404	41	2
266	106		Water Outlet Valve Bypass Stat	DI	01			B	25	13	25	13			Y			Y		3405	41	2
267	106		Water Inlet Valve Normal Status	DI	01			B	25	14	25	14			Y			Y		3406	41	2
268	106		Water Inlet Valve Bypass Status	DI	01			B	25	15	25	15			Y			Y		3407	41	2
269	106		Fail Safe Brake RCCB Off Status	DI	01			B	26	00	26	00						Y		3408	41	2
270	106		Fail Safe Brake RCCB On Status	DI	01			B	26	01	26	01						Y		3409	41	2
271	106		Core Hold Down Not Retracted	DI	01			B	26	02	26	02						Y		3410	41	2
272	106		Core Hold Down Retracted	DI	01			B	26	03	26	03						Y		3411	41	2
273	106		Core Hold Down Not Extended	DI	01			B	26	04	26	04						Y		3412	41	2
274	106		Core Hold Down Extended	DI	01			B	26	05	26	05						Y		3413	41	2
275	106		Core HD Motor RCCB Off Status	DI	01			B	26	06	26	06						Y		3414	41	2
276	106		Core HD Motor RCCB On Status	DI	01			B	26	07	26	07						Y		3415	41	2
277	106		Step Motor Clutch RCCB Off Stat	DI	01			B	26	08	26	08						Y		3416	41	2
278	106		Step Motor Clutch RCCB On Status	DI	01			B	26	09	26	09						Y		3417	41	2
279	106		Step Motor Drive RCCB Off Stat	DI	01			B	26	10	26	10						Y		3418	41	2
280	106		Step Motor Drive RCCB On Stat	DI	01			B	26	11	26	11						Y		3419	41	2
281	106		Rapid Xlation Clutch RCCB Off St	DI	01			B	26	12	26	12						Y		3420	41	2
282	106		Rapid Xlation Clutch RCCB On St	DI	01			B	26	13	26	13						Y		3421	41	2
283	106		Rapid Xlation Mtr RCCB Off Stat	DI	01			B	26	14	26	14						Y		3422	41	2
284	106		Rapid Xlation Mtr RCCB On Status	DI	01			B	26	15	26	15						Y		3423	41	2
285	106		Furnace Position Not Home	DI	01			B	27	00	27	00						Y		3424	41	2
286	106		Furnace Position Home	DI	01			B	27	01	27	01						Y		3425	41	2
287	106		Furn Extreme Trvl Not Exceeded	DI	01			B	27	02	27	02				Y		Y		3426	41	2
288	106		Furn Extreme Trvl Exceeded	DI	01			B	27	03	27	03				Y		Y		3427	41	2
289	106		Ampoule Alignment Not Retracted	DI	01			B	27	04	27	04						Y		3428	41	2
290	106		Ampoule Alignment Retracted	DI	01			B	27	05	27	05						Y		3429	41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 4 of 38)

ENT NO.	CONN.	DESCRIPTION	CMD	UNIT SEL	MNSO G.	NMOS /GW	SOG /DS	TOY /PIX	DATA DESCRIPTION START # WD	START BT	END # WD	END BT	DATA VALUE TY/PE	MON REQ ENT	MON REQ EXT	MON REQ COM	ACK LOG.	CMD DAT	RCIO DE	SID NO.	EXP PIX	TAB BLE
291	106	Ampoule Alignment Not Extended	DI	01			B	27	06	27	06							Y		3430	41	2
292	106	Ampoule Alignment Extended	DI	01			B	27	07	27	07							Y		3431	41	2
293	106	Ampoule Align Mtr RCCB Off Stat	DI	01			B	27	08	27	08							Y		3432	41	2
294	106	Ampoule Align Mtr RCCB On Stat	DI	01			B	27	09	27	09							Y		3433	41	2
295	106	Ampoule Support Not Retracted	DI	01			B	27	10	27	10							Y		3434	41	2
296	106	Ampoule Support Retracted	DI	01			B	27	11	27	11							Y		3435	41	2
297	106	Ampoule Support Not Secure	DI	01			B	27	12	27	12							Y		3436	41	2
298	106	Ampoule Support Secure	DI	01			B	27	13	27	13							Y		3437	41	2
299	106	Ampoule Spt Plt Mtr RCCB Off St	DI	01			B	27	14	27	14							Y		3438	41	2
300	106	Ampoule Spt Plt Mtr RCCB On Stat	DI	01			B	27	15	27	15							Y		3439	41	2
301	106	Cold Guard Mod RCCB Off Status	DI	01			B	28	00	28	00							Y		3256	41	2
302	106	Cold Guard Mod RCCB On Status	DI	01			B	28	01	28	01							Y		3257	41	2
303	106	Carousel Spacer Plt Gap Lim-Not	DI	01			B	28	02	28	02							Y		3440	41	2
304	106	Carousel Spacer Plt Gap Limit	DI	01			B	28	03	28	03							Y		3441	41	2
305	106	Indexing Cam Not Stowed	DI	01			B	28	04	28	04							Y		3442	41	2
306	106	Indexing Cam Stowed	DI	01			B	28	05	28	05							Y		3443	41	2
307	106	Carousel Trk Extr Left Lim-Not	DI	01			B	28	06	28	06							Y		3444	41	2
308	106	Carousel Trk Extr Left Limit	DI	01			B	28	07	28	07							Y		3445	41	2
309	106	Carousel Trk Extr Right Lim-Not	DI	01			B	28	08	28	08							Y		3446	41	2
310	106	Carousel Trk Extr Right Lim	DI	01			B	28	09	28	09							Y		3447	41	2
311	106	Hot Main Red Mod B RCCB Off Stat	DI	01			B	28	10	28	10							Y		3258	41	2
312	106	Hot Main Red Mod B RCCB On Stat	DI	01			B	28	11	28	11							Y		3259	41	2
313	106	SEM Index Motor RCCB Off Status	DI	01			B	28	12	28	12							Y		3448	41	2
314	106	SEM Index Motor RCCB On Status	DI	01			B	28	13	28	13							Y		3449	41	2
315	106	SEM Indexing Jog CCW Status	DI	01			B	28	14	28	14							Y		3450	41	2
316	106	SEM Indexing Jog CW Status	DI	01			B	28	15	28	15							Y		3451	41	2
317	106	Ampoule Not Processing	DI	01			B	29	00	29	00							Y		3452	41	2
318	106	Ampoule Processing	DI	01			B	29	01	29	01							Y		3453	41	2
319	106	System Bus Relay Off Status	DI	01			B	29	02	29	02				Y			Y		3454	41	2
320	106	System Bus Relay On Status	DI	01			B	29	03	29	03				Y			Y		3455	41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 5 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U M S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
321	106		Peltier Pulsing Drv RCCB Off St		DI	01			B	29	04	29	04				Y		3260	41	2
322	106		Peltier Pulsing Drv RCCB On Stat		DI	01			B	29	05	29	05				Y		3261	41	2
001	850		Sync			02														41	2
002	850		Frame Count (SFID)			02														41	2
003	850		Spacelab Experiment ID			02														41	2
004	850		Sample Number (Mode)			02														41	2
005	850		Mission ID			02														41	2
006	850		Furnace Position Not Home			02														41	2
007	850		Furnace Position Home			02														41	2
008	850		Furn Extreme Trvl Not Exceeded			02														41	2
009	850		Furn Extreme Trvl Exceeded			02														41	2
010	850		Core Hold Down Not Retracted			02														41	2
011	850		Core Hold Down Retracted			02														41	2
012	850		Core Hold Down Not Extended			02														41	2
013	850		Core Hold Down Extended			02														41	2
014	850		Water Outlet Valve Normal Stat			02														41	2
015	850		Water Outlet Valve Bypass Stat			02														41	2
016	850		Water Inlet Valve Normal Status			02														41	2
017	850		Water Inlet Valve Bypass Status			02														41	2
018	850		Vacuum Vent Valve Open Status			02														41	2
019	850		Vacuum Vent Valve Closed Status			02														41	2
020	850		Argon Fill Valve Open Status			02														41	2
021	850		Argon Fill Valve Closed Status			02														41	2
022	850		Ampoule Support Not Retracted			02														41	2
023	850		Ampoule Support Retracted			02														41	2
024	850		Ampoule Alignment Not Retracted			02														41	2
025	850		Ampoule Alignment Retracted			02														41	2
026	850		Ampoule Alignment Not Extended			02														41	2
027	850		Ampoule Alignment Extended			02														41	2
028	850		SEM Indexing Jog CCW Status			02														41	2

0 0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 6 of 38)

ENT NO.	C O R . R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O G W F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
029	850		SEM Indexing Jog CW Status			02														41	2
030	850		Ampoule Not Processing			02														41	2
031	850		Ampoule Processing			02														41	2
032	850		Indexing Cam Not Stowed			02														41	2
033	850		Indexing Cam Stowed			02														41	2
034	850		Peltier Connector Not Retracted			02														41	2
035	850		Peltier Connector Retracted			02														41	2
036	850		Peltier Connector Not Extended			02														41	2
037	850		Peltier Connector Extended			02														41	2
038	850		Ampoule 4 Failure 2 Status			02														41	2
039	850		Ampoule 4 Failure 1 Status			02														41	2
040	850		Ampoule 3 Failure 2 Status			02														41	2
041	850		Ampoule 3 Failure 1 Status			02														41	2
042	850		Ampoule 2 Failure 2 Status			02														41	2
043	850		Ampoule 2 Failure 1 Status			02														41	2
044	850		Ampoule 1 Failure 2 Status			02														41	2
045	850		Ampoule 1 Failure 1 Status			02														41	2
046	850		PDS Airflow 1 Status			02														41	2
047	850		PCS Airflqw 1 Status			02														41	2
048	850		IFEA ABS Press 2 RCCB Off Status			02														41	2
049	850		IFEA ABS Press 2 RCCB On Status			02														41	2
050	850		Spare RCCB Off Stat			02														41	2
051	850		Spare RCCB On Stat			02														41	2
052	850		IFEA Coolant Flow #1 Status			02														41	2
053	850		SCS Airflow 1 Status			02														41	2
054	850		Cartridge 2 Failure 2 Status			02														41	2
055	850		Cartridge 2 Failure 1 Status			02														41	2
056	850		Cartridge 1 Failure 2 Status			02														41	2
057	850		Cartridge 1 Failure 1 Status			02														41	2
058	850		Ampoule 6 Failure 2 Status			02														41	2
029	850		SEM Indexing Jog CW Status			02														41	2
030	850		Ampoule Not Processing			02														41	2
031	850		Ampoule Processing			02														41	2
032	850		Indexing Cam Not Stowed			02														41	2
033	850		Indexing Cam Stowed			02														41	2
034	850		Peltier Connector Not Retracted			02														41	2
035	850		Peltier Connector Retracted			02														41	2
036	850		Peltier Connector Not Extended			02														41	2
037	850		Peltier Connector Extended			02														41	2
038	850		Ampoule 4 Failure 2 Status			02														41	2
039	850		Ampoule 4 Failure 1 Status			02														41	2
040	850		Ampoule 3 Failure 2 Status			02														41	2
041	850		Ampoule 3 Failure 1 Status			02														41	2
042	850		Ampoule 2 Failure 2 Status			02														41	2
043	850		Ampoule 2 Failure 1 Status			02														41	2
044	850		Ampoule 1 Failure 2 Status			02														41	2
045	850		Ampoule 1 Failure 1 Status			02														41	2
046	850		PDS Airflow 1 Status			02														41	2
047	850		PCS Airflqw 1 Status			02														41	2
048	850		IFEA ABS Press 2 RCCB Off Status			02														41	2
049	850		IFEA ABS Press 2 RCCB On Status			02														41	2
050	850		Spare RCCB Off Stat			02														41	2
051	850		Spare RCCB On Stat			02														41	2
052	850		IFEA Coolant Flow #1 Status			02														41	2
053	850		SCS Airflow 1 Status			02														41	2
054	850		Cartridge 2 Failure 2 Status			02														41	2
055	850		Cartridge 2 Failure 1 Status			02														41	2
056	850		Cartridge 1 Failure 2 Status			02														41	2
057	850		Cartridge 1 Failure 1 Status			02														41	2
058	850		Ampoule 6 Failure 2 Status			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 7 of 38)

ENT NO.	C O R	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . X C P	C A O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
059	850		Ampoule 6 Failure 1 Status			02															41	2
060	850		Ampoule 5 Failure 2 Status			02															41	2
061	850		Ampoule 5 Failure 1 Status			02															41	2
062	850		Water Outlet Vlv RCCB Off Status			02															41	2
063	850		Water Outlet Vlv RCCB On Status			02															41	2
064	850		Vacuum Vent Vlv RCCB Off Status			02															41	2
065	850		Vacuum Vent Vlv RCCB On Status			02															41	2
066	850		SEM Index Motor RCCB Off Status			02															41	2
067	850		SEM Index Motor RCCB On Status			02															41	2
068	850		Core HD Motor RCCB Off Status			02															41	2
069	850		Core HD Motor RCCB On Status			02															41	2
070	850		Hot Boost Mod A RCCB Off Status			02															41	2
071	850		Hot Boost Mod A RCCB On Status			02															41	2
072	850		Hot Boost Mod B RCCB Off Status			02															41	2
073	850		Hot Boost Mod B RCCB On Status			02															41	2
074	850		Cold Main Prim Mod RCCB Off Stat			02															41	2
075	850		Cold Main Prim Mod RCCB On Stat			02															41	2
076	850		HotMain Prim Mod A RCCB Off Stat			02															41	2
077	850		HotMain Prim Mod A RCCB On Stat			02															41	2
078	850		Carousel Trk Extr Right Lim-Not			02															41	2
079	850		Carousel Trk Extr Right Lim			02															41	2
080	850		Ampoule Support Not Secure			02															41	2
081	850		Ampoule Support Secure			02															41	2
082	850		Carousel Trk Extr Left Lim-Not			02															41	2
083	850		Carousel Trk Extr Left Limit			02															41	2
084	850		Carousel Spacer Plt Gap Lim-Not			02															41	2
085	850		Carousel Spacer Plt Gap Limit			02															41	2
086	850		Ampoule Spt Plt Mtr RCCB Off St			02															41	2
087	850		Ampoule Spt Plt Mtr RCCB On Stat			02															41	2
088	850		Ampoule Align Mtr RCCB Off Stat			02															41	2

0 0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 8 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . C O	/// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
089	850		Ampoule Align Mtr RCCB On Stat			02														41	2
090	850		Water Inlet Valve RCCB Off Stat			02														41	2
091	850		Water Inlet Valve RCCB On Status			02														41	2
092	850		Argon Fill Valve RCCB Off Status			02														41	2
093	850		Argon Fill Valve RCCB On Status			02														41	2
094	850		System Bus Relay Off Status			02														41	2
095	850		System Bus Relay On Status			02														41	2
096	850		IFEA Coolant Flow #2 Status			02														41	2
097	850		PCS Airflow 2 Status			02														41	2
098	850		Cartridge 6 Failure 2 Status			02														41	2
099	850		Cartridge 6 Failure 1 Status			02														41	2
100	850		Cartridge 5 Failure 2 Status			02														41	2
101	850		Cartridge 5 Failure 1 Status			02														41	2
102	850		Cartridge 4 Failure 2 Status			02														41	2
103	850		Cartridge 4 Failure 1 Status			02														41	2
104	850		Cartridge 3 Failure 2 Status			02														41	2
105	850		Cartridge 3 Failure 1 Status			02														41	2
106	850		PCS Utility RCCB Off Status			02														41	2
107	850		PCS Utility RCCB On Status			02														41	2
108	850		Step Motor Drive RCCB Off Stat			02														41	2
109	850		Step Motor Drive RCCB On Stat			02														41	2
110	850		IFEA ABS Press 1 RCCB Off Status			02														41	2
111	850		IFEA ABS Press 1 RCCB On Status			02														41	2
112	850		Peltier Conn Motor RCCB Off Stat			02														41	2
113	850		Peltier Conn Motor RCCB On Stat			02														41	2
114	850		Step Motor Clutch RCCB Off Stat			02														41	2
115	850		Step Motor Clutch RCCB On Status			02														41	2
116	850		Rapid Xlation Clutch RCCB Off St			02														41	2
117	850		Rapid Xlation Clutch RCCB On St			02														41	2
118	850		Rapid Xlation Mtr RCCB Off Stat			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 9 of 38)

ENT NO.	C O R	N O .	DESCRIPTION	C M D U L	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P	C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
119	850		Rapid Xlation Mtr RCCB On Status			02															41	2
120	850		Fail Safe Brake RCCB Off Status			02															41	2
121	850		Fail Safe Brake RCCB On Status			02															41	2
122	850		Cold Main Red Mod RCCB Off Stat			02															41	2
123	850		Cold Main Red Mod RCCB On Status			02															41	2
124	850		Hot Main Prim Mod B RCCB Off Sta			02															41	2
125	850		Hot Main Prim Mod B RCCB On Stat			02															41	2
126	850		Hot Guard Module RCCB Off Status			02															41	2
127	850		Hot Guard Module RCCB On Status			02															41	2
128	850		Mech Pulsing Mod RCCB Off Status			02															41	2
129	850		Mech Pulsing Mod RCCB On Status			02															41	2
130	850		Hot Main Red Mod A RCCB Off Stat			02															41	2
131	850		Hot Main Red Mod A RCCB On Stat			02															41	2
132	850		Cold Guard Mod RCCB Off Status			02															41	2
133	850		Cold Guard Mod RCCB On Status			02															41	2
134	850		Hot Main Red Mod B RCCB Off Stat			02															41	2
135	850		Hot Main Red Mod B RCCB On Stat			02															41	2
136	850		Peltier Pulsing Drv RCCB Off St			02															41	2
137	850		Peltier Pulsing Drv RCCB On Stat			02															41	2
138	850		Sample to Process #1			02															41	2
139	850		Sample to Process #2			02															41	2
140	850		Sample to Process #3			02															41	2
141	850		Sample to Process #4			02															41	2
142	850		Sample to Process #5			02															41	2
143	S850		ample to Process #6			02															41	2
144	850		Processed Sample #1			02															41	2
145	850		Processed Sample #2			02															41	2
146	850		Processed Sample #3			02															41	2
147	850		Processed Sample #4			02															41	2
148	850		Processed Sample #5			02															41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 10 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
149	850		Processed Sample #6			02														41	2
150	850		Last Sample Index			02														41	2
151	850		GMT Day			02														41	2
152	850		GMT Milliseconds of Day			02														41	2
153	850		GMT Fractional Milliseconds			02														41	2
154	850		Last Command Received Word #0			02														41	2
155	850		Last Command Received Word #1			02														41	2
156	850		Last Command Received Word #2			02														41	2
157	850		Last Command Received Word #3			02														41	2
158	850		Last Command Received Word #4			02														41	2
159	850		Last Command Received Word #5			02														41	2
160	850		Last Command Received Word #6			02														41	2
161	850		Last Command Received Word #7			02														41	2
162	850		Last Command Received Word #8			02														41	2
163	850		Last Command Received Word #9			02														41	2
164	850		Last Command Received Word #10			02														41	2
165	850		Last Command Received Word #11			02														41	2
166	850		Last Command Received Word #12			02														41	2
167	850		Last Command Received Word #13			02														41	2
168	850		Last Command Received Word #14			02														41	2
169	850		Last Command Received Word #15			02														41	2
170	850		Last Command Received Word #16			02														41	2
171	850		Last Command Received Word #17			02														41	2
172	850		Last Command Received Word #18			02														41	2
173	850		Last Command Received Word #19			02														41	2
174	850		Last Command Received Word #20			02														41	2
175	850		Last Command Received Word #21			02														41	2
176	850		Last Command Received Word #22			02														41	2
177	850		Last Command Received Word #23			02														41	2
178	850		Last Command Received Word #24			02														41	2

0 3	0 0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 11 of 38)

ENT NO.	CONOR.	DESCRIPTION	CM UD UL K	US AG E	MN SO G.	NM OS /G W D S /	S O F X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P	C A L . C O F	////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
179	850	Last Command Received Word #25			02															41	2
180	850	Last Command Received Word #26			02															41	2
181	850	Last Command Received Word #27			02															41	2
182	850	Last Command Received Word #28			02															41	2
183	850	Last Command Received Word #29			02															41	2
184	850	Last Command Received Word #30			02															41	2
185	850	Last Command Received Word #31			02															41	2
186	850	Invalid Command Flag			02															41	2
187	850	User Requested Data			02															41	2
188	850	ECS Next Timeline Record			02															41	2
189	850	FTS Next Timeline Record			02															41	2
190	850	FHS Cold Guard Next Timeline Rec			02															41	2
191	850	FHS Cold Zone Next Timeline Rec			02															41	2
192	850	FHS Booster Next Timeline Rec			02															41	2
193	850	FHS Hot Zone Next Timeline Rec			02															41	2
194	850	FHS Hot Guard Next Timeline Rec			02															41	2
195	850	SIDS Next Timeline Record			02															41	2
196	850	ECS Current Segment Start Time			02															41	2
197	850	ECS Current Segment Stop Time			02															41	2
198	850	FTS Current Segment Start Time			02															41	2
199	850	FTS Current Segment Stop Time			02															41	2
200	850	FHS Cold Guard Cur Seg Start Tim			02															41	2
201	850	FHS Cold Guard Cur Seg Stop Time			02															41	2
202	850	FHS Cold Zone Cur Seg Start Time			02															41	2
203	850	FHS Cold Zone Cur Seg Stop Time			02															41	2
204	850	FHS Booster Cur Seg Start Time			02															41	2
205	850	FHS Booster Cur Seg Stop Time			02															41	2
206	850	FHS Hot Zone Cur Seg Start Time			02															41	2
207	850	FHS Hot Zone Cur Seg Stop Time			02															41	2
208	850	FHS Hot Guard Cur Seg Start Time			02															41	2

0 0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 12 of 38)

ENT NO.	CON.	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TY PE	MON REQ EN T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
209	850	FHS Hot Guard Cur Seg Stop Time			02														41	2
210	850	SIDS Current Segment Start Time			02														41	2
211	850	SIDS Current Segment Stop Time			02														41	2
212	850	Experiment Main Bus Current			02														41	2
213	850	Experiment Main Bus Voltage			02														41	2
214	850	IFEA Lower Humidity			02														41	2
215	850	IFEA Upper Humidity			02														41	2
216	850	IFEA Absolute Pressure 1			02														41	2
217	850	IFEA Absolute Pressure 2			02														41	2
218	850	IFEA Lower Atmosphere Temp			02														41	2
219	850	IFEA Upper Atmosphere Temp			02														41	2
220	850	IFEA Water Inlet Temp			02														41	2
221	850	IFEA Water Outlet Temp			02														41	2
222	850	RFM Cold End Shell Temp			02														41	2
223	850	RFM Hot End Shell Temp			02														41	2
224	850	RFM Water Outlet Temp			02														41	2
225	850	Sample 1 Temp 1			02														41	2
226	850	Sample 1 Temp 2			02														41	2
227	850	Sample 1 Temp 3			02														41	2
228	850	Sample 1 Temp 4			02														41	2
229	850	Sample 1 Temp 5			02														41	2
230	850	Sample 1 Temp 6			02														41	2
231	850	Sample 2 Temp 1			02														41	2
232	850	Sample 2 Temp 2			02														41	2
233	850	Sample 2 Temp 3			02														41	2
234	850	Sample 2 Temp 4			02														41	2
235	850	Sample 2 Temp 5			02														41	2
236	850	Sample 2 Temp 6			02														41	2
237	850	Sample 3 Temp 1			02														41	2
238	850	Sample 3 Temp 2			02														41	2

0 3	0 0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 13 of 38)

ENT NO.	CONOR.	DESCRIPTION	CMD	USAGE	MNSO G.	NMOS /GW D S /	SOF IX D	TYPE	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY PE	MON REQ EVN TP	CAL ---.LCOF	////////// CD T?	RC IO E	SID NO.	EX PI D	TA BL E
239	850	Sample 3 Temp 3			02														41	2
240	850	Sample 3 Temp 4			02														41	2
241	850	Sample 3 Temp 5			02														41	2
242	850	Sample 3 Temp 6			02														41	2
243	850	Sample 4 Temp 1			02														41	2
244	850	Sample 4 Temp 2			02														41	2
245	850	Sample 4 Temp 3			02														41	2
246	850	Sample 4 Temp 4			02														41	2
247	850	Sample 4 Temp 5			02														41	2
248	850	Sample 4 Temp 6			02														41	2
249	850	Sample 5 Temp 1			02														41	2
250	850	Sample 5 Temp 2			02														41	2
251	850	Sample 5 Temp 3			02														41	2
252	850	Sample 5 Temp 4			02														41	2
253	850	Sample 5 Temp 5			02														41	2
254	850	Sample 5 Temp 6			02														41	2
255	850	Sample 6 Temp 1			02														41	2
256	850	Sample 6 Temp 2			02														41	2
257	850	Sample 6 Temp 3			02														41	2
258	850	Sample 6 Temp 4			02														41	2
259	850	Sample 6 Temp 5			02														41	2
260	850	Sample 6 Temp 6			02														41	2
261	850	Stepping Motor Phase A Current			02														41	2
262	850	Stepping Motor Phase A Voltage			02														41	2
263	850	Stepping Motor Phase B Current			02														41	2
264	850	Stepping Motor Phase B Voltage			02														41	2
265	850	Furnace Linear Position			02														41	2
266	850	FTS Stepping Motor Temp			02														41	2
267	850	Rapid Translation Motor RPM			02														41	2
268	850	Cold Guard Heater Current			02														41	2

0	0	0	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 14 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G	S O W D S /	T O F I X D	Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
269	850		Cold Guard Heater Voltage			02															41	2
270	850		Cold Main Primary Heater Current			02															41	2
271	850		Cold Main Primary Heater Voltage			02															41	2
272	850		Cold Main Red Heater Current			02															41	2
273	850		Cold Main Red Heater Voltage			02															41	2
274	850		Hot Boost Heater Current			02															41	2
275	850		Hot Boost Heater Voltage			02															41	2
276	850		Hot Guard Heater Current			02															41	2
277	850		Hot Guard Heater Voltage			02															41	2
278	850		Hot Main Primary Heater Current			02															41	2
279	850		Hot Main Primary Heater Voltage			02															41	2
280	850		Hot Main Red Heater Current			02															41	2
281	850		Hot Main Red Heater Voltage			02															41	2
282	850		Cold Zone CJ Block Temp 1			02															41	2
283	850		Cold Zone CJ Block Temp 2			02															41	2
284	850		Hot Zone CJ Block Temp 1			02															41	2
285	850		Hot Zone CJ Block Temp 2			02															41	2
286	850		Sample 1 CJ Block Temp 1			02															41	2
287	850		Sample 1 CJ Block Temp 2			02															41	2
288	850		Sample 2 CJ Block Temp 1			02															41	2
289	850		Sample 2 CJ Block Temp 2			02															41	2
290	850		Sample 3 CJ Block Temp 1			02															41	2
291	850		Sample 3 CJ Block Temp 2			02															41	2
292	850		Sample 4 CJ Block Temp 1			02															41	2
293	850		Sample 4 CJ Block Temp 2			02															41	2
294	850		Sample 5 CJ Block Temp 1			02															41	2
295	850		Sample 5 CJ Block Temp 2			02															41	2
296	850		Sample 6 CJ Block Temp 1			02															41	2
297	850		Sample 6 CJ Block Temp 2			02															41	2
298	850		Booster Heater Control Temp 1			02															41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 15 of 38)

ENT NO.	CON.	DESCRIPTION	CMD	USAGE	MNSO/G.	NMOS/G/W/D/S/	S/F/I/X/D	TYP/E/WD#	DATA DESCRIPTION START BT	DATA DESCRIPTION END WD#	DATA DESCRIPTION END BT	DATA DESCRIPTION DATA VALUE TYP/E	MON REQ ENV/NCT	CAL CODE/.CF	CDT?	RC IO D E	SID NO.	EXP/IDP	TAB/LE
299	850	Booster Heater Control Temp 2			02													41	2
300	850	Cold Guard Heater Control Temp 1			02													41	2
301	850	Cold Guard Heater Control Temp 2			02													41	2
302	850	Cold Main Prim Htr Cntrl Temp 1			02													41	2
303	850	Cold Main Prim Htr Cntrl Temp 2			02													41	2
304	850	Cold Main Red Htr Control Temp 1			02													41	2
305	850	Cold Main Red Htr Control Temp 2			02													41	2
306	850	Hot Guard Heater Control Temp 1			02													41	2
307	850	Hot Guard Heater Control Temp 2			02													41	2
308	850	Hot Main Prim Htr Control Temp 1			02													41	2
309	850	Hot Main Prim Htr Control Temp 2			02													41	2
310	850	Hot Main Red Htr Control Temp 1			02													41	2
311	850	Hot Main Red Htr Control Temp 2			02													41	2
312	850	Indexing CAM Rotary Position			02													41	2
313	850	Ampoule Alignment Arm Temp			02													41	2
314	850	SEM Track Temp			02													41	2
315	850	RTD Mux 1 Calibration - High			02													41	2
316	850	RTD Mux 1 Calibration - Low			02													41	2
317	850	RTD Mux 2 Calibration - High			02													41	2
318	850	RTD Mux 2 Calibration - Low			02													41	2
319	850	RTD Mux 3 Calibration - High			02													41	2
320	850	RTD Mux 3 Calibration - Low			02													41	2
321	850	RTD Mux 4 Calibration - High			02													41	2
322	850	RTD Mux 4 Calibration - Low			02													41	2
323	850	RTD Mux 5 Calibration - High			02													41	2
324	850	RTD Mux 5 Calibration - Low			02													41	2
325	850	RTD Mux 6 Calibration - High			02													41	2
326	850	RTD Mux 6 Calibration - Low			02													41	2
327	850	RTD Mux 7 Calibration - High			02													41	2
328	850	RTD Mux 7 Calibration - Low			02													41	2

0	0	0	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 16 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
329	850		RTD Mux 8 Calibration - High			02														41	2
330	850		RTD Mux 8 Calibration - Low			02														41	2
331	850		TC Group A Calibration Type K			02														41	2
332	850		TC Group A Calibration Type S			02														41	2
333	850		TC Group A Calibration Type B			02														41	2
334	850		TC Group B Calibration Type K			02														41	2
335	850		TC Group B Calibration Type S			02														41	2
336	850		TC Group B Calibration Type B			02														41	2
337	850		TC Group C Calibration Type K			02														41	2
338	850		TC Group C Calibration Type S			02														41	2
339	850		TC Group C Calibration Type B			02														41	2
340	850		TC Group D Calibration Type K			02														41	2
341	850		TC Group D Calibration Type S			02														41	2
342	850		TC Group D Calibration Type B			02														41	2
343	850		SMS Board Velocity Reading			02														41	2
344	850		Cold Guard Zone CJ Blck Act Temp			02														41	2
345	850		Cold Main CJ Block Act Temp			02														41	2
346	850		Booster Zone CJ Block Act Temp			02														41	2
347	850		Hot Main Zone CJ Block Act Temp			02														41	2
348	850		Hot Guard Zone CJ Block Act Temp			02														41	2
349	850		Total Calculated Power			02														41	2
350	850		Cold Guard Htr Cmd Current			02														41	2
351	850		Unused			02														41	2
352	850		Cold Main Prim Htr Cmd Current			02														41	2
353	850		Cold Main Red Htr Cmd Current			02														41	2
354	850		Booster Htr Cmd Current			02														41	2
355	850		Unused			02														41	2
356	850		Hot Main Prim Htr Cmd Current			02														41	2
357	850		Hot Main Red Htr Cmd Current			02														41	2
358	850		Hot Guard Htr Cmd Current			02														41	2

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 17 of 38)

ENT NO.	COR.	NO.	DESCRIPTION	CMD U	CMD SA	CMD G E	MN SO G.	NM OS /G	S O W D S	T Y F I X	P E D	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A E V C P	L . C O F	////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
359	850	Unused				02																	41	2
360	850	Cold Guard Zone Setpoint Temp				02																	41	2
361	850	Cold Main Zone Setpoint Temp				02																	41	2
362	850	Booster Zone Setpoint Temp				02																	41	2
363	850	Hot Main Zone Setpoint Temp				02																	41	2
364	850	Hot Guard Zone Setpoint Temp				02																	41	2
365	850	Cold Guard Htr Calc Temp 1				02																	41	2
366	850	Cold Guard Htr Calc Temp 2				02																	41	2
367	850	Unused				02																	41	2
368	850	Unused				02																	41	2
369	850	Cold Main Prim Htr Calc Temp 1				02																	41	2
370	850	Cold Main Prim Htr Calc Temp 2				02																	41	2
371	850	Cold Main Red Htr Calc Temp 1				02																	41	2
372	850	Cold Main Red Htr Calc Temp 2				02																	41	2
373	850	Booster Htr Calc Temp 1				02																	41	2
374	850	Booster Htr Calc Temp 2				02																	41	2
375	850	Unused				02																	41	2
376	850	Unused				02																	41	2
377	850	Hot Main Prim Htr Calc Temp 1				02																	41	2
378	850	Hot Main Prim Htr Calc Temp 2				02																	41	2
379	850	Hot Main Red Htr Calc Temp 1				02																	41	2
380	850	Hot Main Red Htr Calc Temp 2				02																	41	2
381	850	Hot Guard Htr Calc Temp 1				02																	41	2
382	850	Hot Guard Htr Calc Temp 2				02																	41	2
383	850	Unused				02																	41	2
384	850	Unused				02																	41	2
385	850	Cold Guard Zone Act Temp				02																	41	2
386	850	Cold Main Zone Act Temp				02																	41	2
387	850	Booster Zone Act Temp				02																	41	2
388	850	Hot Main Zone Act Temp				02																	41	2

ENT NO.	COR.	NO.	DESCRIPTION	CMD U	CMD SA	CMD G E	MN SO G.	NM OS /G	S O W D S	T Y F I X	P E D	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A E V C P	L . C O F	////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
0 3	0 6	0 7		3 9	4 0		4 3	4 5	4 7	4 8		5 1	5 3	5 5	5 7		6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 18 of 38)

ENT NO.	CON.	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
389	850	Hot Guard Zone Act Temp			02														41	2
390	850	Cold Guard Zone Delta Temp			02														41	2
391	850	Cold Main Zone Delta Temp			02														41	2
392	850	Booster Zone Delta Temp			02														41	2
393	850	Hot Main Zone Delta Temp			02														41	2
394	850	Hot Guard Zone Delta Temp			02														41	2
395	850	Cold Guard Zone Uncpld Power			02														41	2
396	850	Cold Main Zone Uncpld Power			02														41	2
397	850	Booster Zone Uncpld Power			02														41	2
398	850	Hot Main Zone Uncpld Power			02														41	2
399	850	Hot Guard Zone Uncpld Power			02														41	2
400	850	Cold Guard Zone Prop Power			02														41	2
401	850	Cold Main Zone Prop Power			02														41	2
402	850	Booster Zone Prop Power			02														41	2
403	850	Hot Main Zone Prop Power			02														41	2
404	850	Hot Guard Zone Prop Power			02														41	2
405	850	Cold Guard Zone Int Power			02														41	2
406	850	Cold Main Zone Int Power			02														41	2
407	850	Booster Zone Int Power			02														41	2
408	850	Hot Main Zone Int Power			02														41	2
409	850	Hot Guard Zone Int Power			02														41	2
410	850	Cold Guard Zone Power			02														41	2
411	850	Cold Main Zone Power			02														41	2
412	850	Booster Zone Power			02														41	2
413	850	Hot Main Zone Power			02														41	2
414	850	Hot Guard Zone Power			02														41	2
415	850	Cold Guard Htr Calc Voltage			02														41	2
416	850	Unused			02														41	2
417	850	Cold Main Prim Htr Calc Voltage			02														41	2
418	850	Cold Main Red Htr Calc Voltage			02														41	2
003	006	700			349	445	478		513	535	557			656	667		712	775		802	

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 19 of 38)

ENT NO.	CON.	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ EVN T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
419	850	Booster Htr Calc Voltage			02														41	2
420	850	Unused			02														41	2
421	850	Hot Main Prim Htr Calc Voltage			02														41	2
422	850	Hot Main Red Htr Calc Voltage			02														41	2
423	850	Hot Guard Htr Calc Voltage			02														41	2
424	850	Unused			02														41	2
425	850	Cold Guard Htr Act Current			02														41	2
426	850	Unused			02														41	2
427	850	Cold Main Prim Htr Act Current			02														41	2
428	850	Cold Main Red Htr Act Current			02														41	2
429	850	Booster Htr Act Current			02														41	2
430	850	Unused			02														41	2
431	850	Hot Main Prim Htr Act Current			02														41	2
432	850	Hot Main Red Htr Act Current			02														41	2
433	850	Hot Guard Htr Act Current			02														41	2
434	850	Unused			02														41	2
435	850	Cold Guard Htr Calc Resistance			02														41	2
436	850	Unused			02														41	2
437	850	ColdMain Prim Htr Calc Resistnce			02														41	2
438	850	ColdMain Red Htr Calc Resistance			02														41	2
439	850	Booster Htr Resistance			02														41	2
440	850	Unused			02														41	2
441	850	HOTMain Prim Htr Calc Resistance			02														41	2
442	850	Hot Main Red Htr Calc Resistance			02														41	2
443	850	Hot Guard Htr Calc Resistance			02														41	2
444	850	Unused			02														41	2
445	850	Cold Guard Htr Limited Power			02														41	2
446	850	Unused			02														41	2
447	850	Cold Main Prim Htr Limited Power			02														41	2
448	850	Cold Main Red Htr Limited Power			02														41	2
041	850	Unused			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 20 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
449	850		Booster Htr Limited Power			02														41	2
450	850		Unused			02														41	2
451	850		Hot Main Prim Htr Limited Power			02														41	2
452	850		Hot Main Red Htr Limited Power			02														41	2
453	850		Hot Guard Htr Limited Power			02														41	2
454	850		Unused			02														41	2
455	850		Cold Guard Htr Des Current			02														41	2
456	850		Unused			02														41	2
457	850		Cold Main Prim Htr Des Current			02														41	2
458	850		Cold Main Red Htr Des Current			02														41	2
459	850		Booster Htr Des Current			02														41	2
460	850		Unused			02														41	2
461	850		Hot Main Prim Htr Des Current			02														41	2
462	850		Hot Main Red Htr Des Current			02														41	2
463	850		Hot Guard Htr Des Current			02														41	2
464	850		Unused			02														41	2
465	850		Cold Guard Zone Saturation Flag			02														41	2
466	850		Cold Main Zone Saturation Flag			02														41	2
467	850		Booster Zone Saturation Flag			02														41	2
468	850		Hot Main Zone Saturation Flag			02														41	2
469	850		Hot Guard Zone Saturation Flag			02														41	2
470	850		Integral Power Fault Time			02														41	2
471	850		Fault Sum Delta Power			02														41	2
472	850		Fault Integral Gain			02														41	2
473	850		Fault Proportional Gain			02														41	2
474	850		Fault Intermediate Calc. Value 1			02														41	2
475	850		Fault Intermediate Calc. Value 2			02														41	2
476	850		Fault Delta Power - Previous			02														41	2
477	850		Fault Delta Power - 2nd Previous			02														41	2
478	850		Faulted Zone			02														41	2

0 0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 21 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O /G F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
479	850		Integral Gain Array 1			02														41	2
480	850		Integral Gain Array 2			02														41	2
481	850		Integral Gain Array 3			02														41	2
482	850		Integral Gain Array 4			02														41	2
483	850		Integral Gain Array 5			02														41	2
484	850		Proportional Gain Array 1			02														41	2
485	850		Proportional Gain Array 2			02														41	2
486	850		Proportional Gain Array 3			02														41	2
487	850		Proportional Gain Array 4			02														41	2
488	850		Proportional Gain Array 5			02														41	2
489	850	FF	Ampoule Align Not Extended			02														41	2
490	850	FF	Ampoule Align Extended			02														41	2
491	850	FF	Ampoule Align Mtr RCCB Off			02														41	2
492	850	FF	Ampoule Align Mtr RCCB On			02														41	2
493	850	FF	Car Trk Extr Right Lim-Not			02														41	2
494	850	FF	Car Trk Extr Right Lim			02														41	2
495	850	FF	Car Trk Extr Left Limit-Not			02														41	2
496	850	FF	Car Trk Extr Left Limit			02														41	2
497	850	FF	Car Spacer Plt Gap Lim-Not			02														41	2
498	850	FF	Car Spacer Plt Gap Lim			02														41	2
499	850	FF	Indexing Cam Not Stowed			02														41	2
500	850	FF	Indexing Cam Stowed			02														41	2
501	850	FF	Ampoule Not Processing			02														41	2
502	850	FF	Ampoule Processing			02														41	2
503	850	FF	SEM Index Motor RCCB On Stat			02														41	2
504	850	FF	SEM Index Motor RCCB Off Stat			02														41	2
505	850	FF	Fail Safe Brake RCCB Off			02														41	2
506	850	FF	Fail Safe Brake RCCB On			02														41	2
507	850	FF	Core Hold Down Not Retracted			02														41	2
508	850	FF	Core Hold Down Retracted			02														41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 22 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
509	850	FF	Core Hold Down Not Extended			02														41	2
510	850	FF	Core Hold Down Extended			02														41	2
511	850	FF	Core HD Motor RCCB Off			02														41	2
512	850	FF	Core HD Motor RCCB On			02														41	2
513	850	FF	Ampoule Support Not Retracted			02														41	2
514	850	FF	Ampoule Support Retracted			02														41	2
515	850	FF	Ampoule Support Not Secure			02														41	2
516	850	FF	Ampoule Support Secure			02														41	2
517	850	FF	Ampoule Spt Plt Mtr RCCB Off			02														41	2
518	850	FF	Ampoule Spt Plt Mtr RCCB On			02														41	2
519	850	FF	Ampoule Align Not Retracted			02														41	2
520	850	FF	Ampoule Align Retracted			02														41	2
521	850	FF	PCS Utility RCCB Off			02														41	2
522	850	FF	PCS Utility RCCB On			02														41	2
523	850	FF	System Bus Relay Off			02														41	2
524	850	FF	System Bus Relay On			02														41	2
525	850	FF	Furnace Position Not Home			02														41	2
526	850	FF	Furnace Position Home			02														41	2
527	850	FF	Furn Extrme Trvl Not Exceeded			02														41	2
528	850	FF	Furn Extreme Trvl Exceeded			02														41	2
529	850	FF	Step Motor Drive RCCB Off			02														41	2
530	850	FF	Step Motor Drive RCCB On			02														41	2
531	850	FF	Step Motor Clutch RCCB Off			02														41	2
532	850	FF	Step Motor Clutch RCCB On			02														41	2
533	850	FF	Rapid Xlation Mtr RCCB Off			02														41	2
534	850	FF	Rapid Xlation Mtr RCCB On			02														41	2
535	850	FF	Rapid Xlation Clutch RCCB Off			02														41	2
536	850	FF	Rapid Xlation Clutch RCCB On			02														41	2
537	850	FF	Water Inlet Valve RCCB Off			02														41	2
538	850	FF	Water Inlet Valve RCCB On			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7		6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 23 of 38)

ENT NO.	C O R	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . C O F	////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
539	850	FF	Vacuum Vent Valve Closed			02														41	2
540	850	FF	Vacuum Vent Valve Open			02														41	2
541	850	FF	Vacuum Vent Vlv RCCB Off			02														41	2
542	850	FF	Vacuum Vent Vlv RCCB On			02														41	2
543	850	FF	IFEA ABS Press 2 RCCB Off			02														41	2
544	850	FF	IFEA ABS Press 2 RCCB On			02														41	2
545	850	FF	IFEA ABS Press 1 RCCB Off			02														41	2
546	850	FF	IFEA ABS Press 1 RCCB On			02														41	2
547	850	FF	Argon Fill Valve Closed			02														41	2
548	850	FF	Argon Fill Valve Open			02														41	2
549	850	FF	Argon Fill Valve RCCB Off			02														41	2
550	850	FF	Argon Fill Valve RCCB On			02														41	2
551	850	FF	SEM Indexing Jog CW Status			02														41	2
552	850	FF	SEM Indexing Jog CCW Status			02														41	2
553	850	FF	Ampoule 5 Failure 2 Status			02														41	2
554	850	FF	Ampoule 5 Failure 1 Status			02														41	2
555	850	FF	Ampoule 4 Failure 2 Status			02														41	2
556	850	FF	Ampoule 4 Failure 1 Status			02														41	2
557	850	FF	Ampoule 3 Failure 2 Status			02														41	2
558	850	FF	Ampoule 3 Failure 1 Status			02														41	2
559	850	FF	Ampoule 2 Failure 2 Status			02														41	2
560	850	FF	Ampoule 2 Failure 1 Status			02														41	2
561	850	FF	Ampoule 1 Failure 2 Status			02														41	2
562	850	FF	Ampoule 1 Failure 1 Status			02														41	2
563	850	FF	Water Outlet Valve Bypass			02														41	2
564	850	FF	Water Outlet Valve Normal			02														41	2
565	850	FF	Water Outlet Vlv RCCB Off			02														41	2
566	850	FF	Water Outlet Vlv RCCB On			02														41	2
567	850	FF	Water Inlet Valve Bypass			02														41	2
568	850	FF	Water Inlet Valve Normal			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 24 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U	U S A G E	MN SO G.	NM OS /G	S O W D S /	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ EN T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
569	850	FF	Mech Pulsing Mod RCCB Off			02														41	2
570	850	FF	Mech Pulsing Mod RCCB On			02														41	2
571	850	FF	Cartridge 6 Failure 2 Status			02														41	2
572	850	FF	Cartridge 6 Failure 1 Status			02														41	2
573	850	FF	Cartridge 5 Failure 2 Status			02														41	2
574	850	FF	Cartridge 5 Failure 1 Status			02														41	2
575	850	FF	Cartridge 4 Failure 2 Status			02														41	2
576	850	FF	Cartridge 4 Failure 1 Status			02														41	2
577	850	FF	Cartridge 3 Failure 2 Status			02														41	2
578	850	FF	Cartridge 3 Failure 1 Status			02														41	2
579	850	FF	Cartridge 2 Failure 2 Status			02														41	2
580	850	FF	Cartridge 2 Failure 1 Status			02														41	2
581	850	FF	Cartridge 1 Failure 2 Status			02														41	2
582	850	FF	Cartridge 1 Failure 1 Status			02														41	2
583	850	FF	Ampoule 6 Failure 2 Status			02														41	2
584	850	FF	Ampoule 6 Failure 1 Status			02														41	2
585	850	FF	Hot Boost Mod A RCCB Off			02														41	2
586	850	FF	Hot Boost Mod A RCCB On			02														41	2
587	850	FF	Cold Main Red Mod RCCB Off			02														41	2
588	850	FF	Cold Main Red Mod RCCB On			02														41	2
589	850	FF	Cold Main Prim Mod RCCB Off			02														41	2
590	850	FF	Cold Main Prim Mod RCCB On			02														41	2
591	850	FF	Cold Guard Mod RCCB Off			02														41	2
592	850	FF	Cold Guard Mod RCCB On			02														41	2
593	850	FF	Peltier Conn Retracted-Not			02														41	2
594	850	FF	Peltier Conn Retracted			02														41	2
595	850	FF	Peltier Conn Extended-Not			02														41	2
596	850	FF	Peltier Conn Extended			02														41	2
597	850	FF	Peltier Conn Motor RCCB Off			02														41	2
598	850	FF	Peltier Conn Motor RCCB On			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7		6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 25 of 38)

ENT NO.	CONOR.	DESCRIPTION	CMD UL	CUSAG E	MNSOG.	NMOS/GWDS	STOI/XD	TPE	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY PE	MON REQ EN T	CAL EX CO FE	////// CDT?	RC IO D E	SID NO.	EXP I D	TAB L E
599	850	FF Peltier Pulsing Drv RCCB Off			02														41	2
600	850	FF Peltier Pulsing Drv RCCB On			02														41	2
601	850	FF SCS Airflow 1 Status			02														41	2
602	850	FF PDS Airflow 1 Status			02														41	2
603	850	FF PCS Airflow 2 Status			02														41	2
604	850	FF PCS Airflow 1 Status			02														41	2
605	850	FF Hot Main Red Mod B RCCB Off			02														41	2
606	850	FF Hot Main Red Mod B RCCB On			02														41	2
607	850	FF Hot Main Red Mod A RCCB Off			02														41	2
608	850	FF Hot Main Red Mod A RCCB On			02														41	2
609	850	FF Hot Main Prim Mod B RCCB Off			02														41	2
610	850	FF Hot Main Prim Mod B RCCB On			02														41	2
611	850	FF HotMain Prim Mod A RCCB Off			02														41	2
612	850	FF HotMain Prim Mod A RCCB On			02														41	2
613	850	FF Hot Guard Module RCCB Off			02														41	2
614	850	FF Hot Guard Module RCCB On			02														41	2
615	850	FF Hot Boost Mod B RCCB Off			02														41	2
616	850	FF Hot Boost Mod B RCCB On			02														41	2
617	850	FF Hot Main Prim Htr Ctl Temp 1			02														41	2
618	850	FF Cold Main Red Htr Ctl Temp 1			02														41	2
619	850	FF TC Group A Calibration Type B			02														41	2
620	850	FF TC Group A Calibration Type S			02														41	2
621	850	FF TC Group A Calibration Type K			02														41	2
622	850	FF Cold Guard Heater Ctl Temp 2			02														41	2
623	850	FF Cold Main Prim Htr Ctl Temp 2			02														41	2
624	850	FF Booster Heater Ctl Temp 2			02														41	2
625	850	FF Hot Main Red Htr Ctl Temp 2			02														41	2
626	850	FF Hot Main Prim Htr Ctl Temp 2			02														41	2
627	850	FF Hot Guard Heater Ctl Temp 2			02														41	2
628	850	FF TC Group B Calibration Type B			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 26 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L E V C P	C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
629	850	FF	TC Group B Calibration Type S			02															41	2
630	850	FF	TC Group B Calibration Type K			02															41	2
631	850	FF	IFEA Coolant Flow #2 Status			02															41	2
632	850	FF	IFEA Coolant Flow #1 Status			02															41	2
633	850	FF	Sample 4 Temp 1			02															41	2
634	850	FF	Sample 3 Temp 1			02															41	2
635	850	FF	Sample 2 Temp 1			02															41	2
636	850	FF	Sample 1 Temp 1			02															41	2
637	850	FF	Cold Main Red Htr Ctl Temp 2			02															41	2
638	850	FF	TC Group D Calibration Type B			02															41	2
639	850	FF	TC Group D Calibration Type S			02															41	2
640	850	FF	TC Group D Calibration Type K			02															41	2
641	850	FF	Cold Guard Heater Ctl Temp 1			02															41	2
642	850	FF	Cold Main Prim Htr Ctl Temp 1			02															41	2
643	850	FF	Booster Heater Ctl Temp 1			02															41	2
644	850	FF	Hot Guard Heater Ctl Temp 1			02															41	2
645	850	FF	TC Group C Calibration Type B			02															41	2
646	850	FF	TC Group C Calibration Type S			02															41	2
647	850	FF	TC Group C Calibration Type K			02															41	2
648	850	FF	Hot Main Red Htr Ctl Temp 1			02															41	2
649	850	FF	Sample 2 Temp 4			02															41	2
650	850	FF	Sample 1 Temp 4			02															41	2
651	850	FF	Sample 6 Temp 3			02															41	2
652	850	FF	Sample 5 Temp 3			02															41	2
653	850	FF	Sample 4 Temp 3			02															41	2
654	850	FF	Sample 3 Temp 3			02															41	2
655	850	FF	Sample 2 Temp 3			02															41	2
656	850	FF	Sample 1 Temp 3			02															41	2
657	850	FF	Sample 6 Temp 2			02															41	2
658	850	FF	Sample 5 Temp 2			02															41	2

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 27 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ EVNT	C A L . C O F	C D T ?	RC IO E	SID NO.	E X P I D	T A B L E
659	850	FF	Sample 4 Temp 2			02														41	2
660	850	FF	Sample 3 Temp 2			02														41	2
661	850	FF	Sample 2 Temp 2			02														41	2
662	850	FF	Sample 1 Temp 2			02														41	2
663	850	FF	Sample 6 Temp 1			02														41	2
664	850	FF	Sample 5 Temp 1			02														41	2
665	850	FF	Sample 6 Temp 6			02														41	2
666	850	FF	Sample 5 Temp 6			02														41	2
667	850	FF	Sample 4 Temp 6			02														41	2
668	850	FF	Sample 3 Temp 6			02														41	2
669	850	FF	Sample 2 Temp 6			02														41	2
670	850	FF	Sample 1 Temp 6			02														41	2
671	850	FF	Sample 6 Temp 5			02														41	2
672	850	FF	Sample 5 Temp 5			02														41	2
673	850	FF	Sample 4 Temp 5			02														41	2
674	850	FF	Sample 3 Temp 5			02														41	2
675	850	FF	Sample 2 Temp 5			02														41	2
676	850	FF	Sample 1 Temp 5			02														41	2
677	850	FF	Sample 6 Temp 4			02														41	2
678	850	FF	Sample 5 Temp 4			02														41	2
679	850	FF	Sample 4 Temp 4			02														41	2
680	850	FF	Sample 3 Temp 4			02														41	2
681	850	FF	Sample 4 CJ Block Temp 1			02														41	2
682	850	FF	Sample 3 CJ Block Temp 2			02														41	2
683	850	FF	Sample 3 CJ Block Temp 1			02														41	2
684	850	FF	Sample 2 CJ Block Temp 2			02														41	2
685	850	FF	Sample 2 CJ Block Temp 1			02														41	2
686	850	FF	Sample 1 CJ Block Temp 2			02														41	2
687	850	FF	Sample 1 CJ Block Temp 1			02														41	2
688	850	FF	RFM Water Outlet Temp			02														41	2

03	06	07	34	40	43	45	47	48	51	53	55	57	65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 28 of 38)

ENT NO.	CONOR.	DESCRIPTION	CMD	USAGE	MNSOG.	NMOS/GW DS	SOI XD	TYP E	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY PE	MONREQ VNTP	CAEXCF	////////// CDT?	RCIOD E	SID NO.	EX PI DE	TA BL	
689	850 FF	Cold Zone CJ Block Temp 2			02														41	2	
690	850 FF	Cold Zone CJ Block Temp 1			02														41	2	
691	850 FF	Hot Zone CJ Block Temp 1			02														41	2	
692	850 FF	Hot Zone CJ Block Temp 2			02														41	2	
693	850 FF	RFM Hot End Shell Temp			02														41	2	
694	850 FF	RFM Cold End Shell Temp			02														41	2	
695	850 FF	IFEA Water Inlet Temp			02														41	2	
696	850 FF	IFEA Water Outlet Temp			02														41	2	
697	850 FF	RTD Mux 3 Calibration - Low			02														41	2	
698	850 FF	RTD Mux 3 Calibration - High			02														41	2	
699	850 FF	RTD Mux 2 Calibration - Low			02														41	2	
700	850 FF	RTD Mux 2 Calibration - High			02														41	2	
701	850 FF	RTD Mux 1 Calibration - Low			02														41	2	
702	850 FF	RTD Mux 1 Calibration - High			02														41	2	
703	850 FF	IFEA Upper Atmosphere Temp			02														41	2	
704	850 FF	IFEA Lower Atmosphere Temp			02														41	2	
705	850 FF	FTS Stepping Motor Temp			02														41	2	
706	850 FF	SEM Track Temp			02														41	2	
707	850 FF	Ampoule Alignment Arm Temp			02														41	2	
708	850 FF	Sample 6 CJ Block Temp 2			02														41	2	
709	850 FF	Sample 6 CJ Block Temp 1			02														41	2	
710	850 FF	Sample 5 CJ Block Temp 2			02														41	2	
711	850 FF	Sample 5 CJ Block Temp 1			02														41	2	
712	850 FF	Sample 4 CJ Block Temp 2			02														41	2	
713	850 FF	Cold Main Red Heater Current			02														41	2	
714	850 FF	Cold Main Red Heater Voltage			02														41	2	
715	850 FF	Cold Main Primary Heater Cur			02														41	2	
716	850 FF	Cold Main Primary Heater Volt			02														41	2	
717	850 FF	Cold Guard Heater Current			02														41	2	
718	850 FF	Cold Guard Heater Voltage			02														41	2	
003	006 007				349	445	478		513	535	537			656	667	712	772	785	800		

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 29 of 38)

ENT NO.	C O R	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O G I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ ---V N T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
719	850	FF	RTD Mux 8 Calibration - Low			02														41	2
720	850	FF	RTD Mux 8 Calibration - High			02														41	2
721	850	FF	RTD Mux 7 Calibration - Low			02														41	2
722	850	FF	RTD Mux 7 Calibration - High			02														41	2
723	850	FF	RTD Mux 6 Calibration - Low			02														41	2
724	850	FF	RTD Mux 6 Calibration - High			02														41	2
725	850	FF	RTD Mux 5 Calibration - Low			02														41	2
726	850	FF	RTD Mux 5 Calibration - High			02														41	2
727	850	FF	RTD Mux 4 Calibration - Low			02														41	2
728	850	FF	RTD Mux 4 Calibration - High			02														41	2
729	850	FF	IFEA Lower Humidity			02														41	2
730	850	FF	Rapid Translation Motor RPM			02														41	2
731	850	FF	Indexing CAM Rotary Position			02														41	2
732	850	FF	Furnace Linear Position			02														41	2
733	850	FF	Stepping Motor Phase B Cur			02														41	2
734	850	FF	Stepping Motor Phase B Volt			02														41	2
735	850	FF	Stepping Motor Phase A Cur			02														41	2
736	850	FF	Stepping Motor Phase A Volt			02														41	2
737	850	FF	Hot Main Red Heater Current			02														41	2
738	850	FF	Hot Main Red Heater Voltage			02														41	2
739	850	FF	Hot Main Primary Heater Cur			02														41	2
740	850	FF	Hot Main Primary Heater Volt			02														41	2
741	850	FF	Hot Guard Heater Current			02														41	2
742	850	FF	Hot Guard Heater Voltage			02														41	2
743	850	FF	Hot Boost Heater Current			02														41	2
744	850	FF	Hot Boost Heater Voltage			02														41	2
745	850	FF	SMS Board Velocity Reading			02														41	2
746	850	FF	Experiment Main Bus Voltage			02														41	2
747	850	FF	Experiment Main Bus Current			02														41	2
748	850	FF	IFEA Absolute Pressure 2			02														41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 30 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START ----- WD #	BT	END ----- WD #	BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
749	850	FF	IFEA Absolute Pressure 1			02														41	2
750	850	FF	IFEA Upper Humidity			02														41	2
001	851	RC	SEM Index Motor RCCB On Stat			02														41	2
002	851	RC	SEM Index Motor RCCB Off Stat			02														41	2
003	851	RC	Ampoule Not Processing			02														41	2
004	851	RC	Ampoule Processing			02														41	2
005	851	RC	Indexing Cam Not Stowed			02														41	2
006	851	RC	Indexing Cam Stowed			02														41	2
007	851	RC	Car Spacer Plt Gap Lim-Not			02														41	2
008	851	RC	Car Spacer Plt Gap Lim			02														41	2
009	851	RC	Car Trk Extr Left Limit-Not			02														41	2
010	851	RC	Car Trk Extr Left Limit			02														41	2
011	851	RC	Car Trk Extr Right Lim-Not			02														41	2
012	851	RC	Car Trk Extr Right Lim			02														41	2
013	851	RC	Ampoule Align Mtr RCCB Off			02														41	2
014	851	RC	Ampoule Align Mtr RCCB On			02														41	2
015	851	RC	Ampoule Align Not Extended			02														41	2
016	851	RC	Ampoule Align Extended			02														41	2
017	851	RC	Ampoule Align Not Retracted			02														41	2
018	851	RC	Ampoule Align Retracted			02														41	2
019	851	RC	Ampoule Spt Plt Mtr RCCB Off			02														41	2
020	851	RC	Ampoule Spt Plt Mtr RCCB On			02														41	2
021	851	RC	Ampoule Support Not Secure			02														41	2
022	851	RC	Ampoule Support Secure			02														41	2
023	851	RC	Ampoule Support Not Retracted			02														41	2
024	851	RC	Ampoule Support Retracted			02														41	2
025	851	RC	Core HD Motor RCCB Off			02														41	2
026	851	RC	Core HD Motor RCCB On			02														41	2
027	851	RC	Core Hold Down Not Extended			02														41	2
028	851	RC	Core Hold Down Extended			02														41	2
0 0 3	0 0 6	0 0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 31 of 38)

ENT NO.	C O R R	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . E X C P	C A O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
029	851	RC	Core Hold Down Not Retracted			02															41	2
030	851	RC	Core Hold Down Retracted			02															41	2
031	851	RC	Fail Safe Brake RCCB Off			02															41	2
032	851	RC	Fail Safe Brake RCCB On			02															41	2
033	851	RC	Rapid Xlation Clutch RCCB Off			02															41	2
034	851	RC	Rapid Xlation Clutch RCCB On			02															41	2
035	851	RC	Rapid Xlation Mtr RCCB Off			02															41	2
036	851	RC	Rapid Xlation Mtr RCCB On			02															41	2
037	851	RC	Step Motor Clutch RCCB Off			02															41	2
038	851	RC	Step Motor Clutch RCCB On			02															41	2
039	851	RC	Step Motor Drive RCCB Off			02															41	2
040	851	RC	Step Motor Drive RCCB On			02															41	2
041	851	RC	Furn Extrme Trvl Not Exceeded			02															41	2
042	851	RC	Furn Extrdme Trvl Exceeded			02															41	2
043	851	RC	Furnace Position Not Home			02															41	2
044	851	RC	Furnace Position Home			02															41	2
045	851	RC	System Bus Relay Off			02															41	2
046	851	RC	System Bus Relay On			02															41	2
047	851	RC	PCS Utility RCCB Off			02															41	2
048	851	RC	PCS Utility RCCB On			02															41	2
049	851	RC	SEM Indexing Jog CW Status			02															41	2
050	851	RC	SEM Indexing Jog CCW Status			02															41	2
051	851	RC	Argon Fill Valve RCCB Off			02															41	2
052	851	RC	Argon Fill Valve RCCB On			02															41	2
053	851	RC	Argon Fill Valve Closed			02															41	2
054	851	RC	Argon Fill Valve Open			02															41	2
055	851	RC	IFEA ABS Press 1 RCCB Off			02															41	2
056	851	RC	IFEA ABS Press 1 RCCB On			02															41	2
057	851	RC	IFEA ABS Press 2 RCCB Off			02															41	2
058	851	RC	IFEA ABS Press 2 RCCB On			02															41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0	

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 32 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U	U S A G E	MN SO G.	NM OS /G	S O W D /	T Y F I X	P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . C O • P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
059	851	RC Vacuum Vent Vlv RCCB Off				02															41	2
060	851	RC Vacuum Vent Vlv RCCB On				02															41	2
061	851	RC Vacuum Vent Valve Closed				02															41	2
062	851	RC Vacuum Vent Valve Open				02															41	2
063	851	RC Water Inlet Valve RCCB Off				02															41	2
064	851	RC Water Inlet Valve RCCB On				02															41	2
065	851	RC Water Inlet Valve Bypass				02															41	2
066	851	RC Water Inlet Valve Normal				02															41	2
067	851	RC Water Outlet Vlv RCCB Off				02															41	2
068	851	RC Water Outlet Vlv RCCB On				02															41	2
069	851	RC Water Outlet Valve Bypass				02															41	2
070	851	RC Water Outlet Valve Normal				02															41	2
071	851	RC Ampoule 1 Failure 2 Status				02															41	2
072	851	RC Ampoule 1 Failure 1 Status				02															41	2
073	851	RC Ampoule 2 Failure 2 Status				02															41	2
074	851	RC Ampoule 2 Failure 1 Status				02															41	2
075	851	RC Ampoule 3 Failure 2 Status				02															41	2
076	851	RC Ampoule 3 Failure 1 Status				02															41	2
077	851	RC Ampoule 4 Failure 2 Status				02															41	2
078	851	RC Ampoule 4 Failure 1 Status				02															41	2
079	851	RC Ampoule 5 Failure 2 Status				02															41	2
080	851	RC Ampoule 5 Failure 1 Status				02															41	2
081	851	RC Ampoule 6 Failure 2 Status				02															41	2
082	851	RC Ampoule 6 Failure 1 Status				02															41	2
083	851	RC Cartridge 1 Failure 2 Status				02															41	2
084	851	RC Cartridge 1 Failure 1 Status				02															41	2
085	851	RC Cartridge 2 Failure 2 Status				02															41	2
086	851	RC Cartridge 2 Failure 1 Status				02															41	2
087	851	RC Cartridge 3 Failure 2 Status				02															41	2
088	851	RC Cartridge 3 Failure 1 Status				02															41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 33 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P	SID NO.	E X P I D	T A B L E
089	851	RC	Cartridge 4 Failure 2 Status			02												41	2
090	851	RC	Cartridge 4 Failure 1 Status			02												41	2
091	851	RC	Cartridge 5 Failure 2 Status			02												41	2
092	851	RC	Cartridge 5 Failure 1 Status			02												41	2
093	851	RC	Cartridge 6 Failure 2 Status			02												41	2
094	851	RC	Cartridge 6 Failure 1 Status			02												41	2
095	851	RC	Mech Pulsing Mod RCCB On			02												41	2
096	851	RC	Mech Pulsing Mod RCCB Off			02												41	2
097	851	RC	Peltier Pulsing Drv RCCB Off			02												41	2
098	851	RC	Peltier Pulsing Drv RCCB On			02												41	2
099	851	RC	Peltier Conn Motor RCCB Off			02												41	2
100	851	RC	Peltier Conn Motor RCCB On			02												41	2
101	851	RC	Peltier Conn Extended-Not			02												41	2
102	851	RC	Peltier Conn Extended			02												41	2
103	851	RC	Peltier Conn Retracted-Not			02												41	2
104	851	RC	Peltier Conn Retracted			02												41	2
105	851	RC	Cold Guard Mod RCCB Off			02												41	2
106	851	RC	Cold Guard Mod RCCB On			02												41	2
107	851	RC	Cold Main Prim Mod RCCB Off			02												41	2
108	851	RC	Cold Main Prim Mod RCCB On			02												41	2
109	851	RC	Cold Main Red Mod RCCB Off			02												41	2
110	851	RC	Cold Main Red Mod RCCB On			02												41	2
111	851	RC	Hot Boost Mod A RCCB Off			02												41	2
112	851	RC	Hot Boost Mod A RCCB On			02												41	2
113	851	RC	Hot Boost Mod B RCCB Off			02												41	2
114	851	RC	Hot Boost Mod B RCCB On			02												41	2
115	851	RC	Hot Guard Module RCCB Off			02												41	2
116	851	RC	Hot Guard Module RCCB On			02												41	2
117	851	RC	HotMain Prim Mod A RCCB Off			02												41	2
118	851	RC	HotMain Prim Mod A RCCB On			02												41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 34 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L E X C P	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
119	851	RC Hot Main Prim Mod B RCCB Off				02															41	2
120	851	RC Hot Main Prim Mod B RCCB On				02															41	2
121	851	RC Hot Main Red Mod A RCCB Off				02															41	2
122	851	RC Hot Main Red Mod A RCCB On				02															41	2
123	851	RC Hot Main Red Mod B RCCB Off				02															41	2
124	851	RC Hot Main Red Mod B RCCB On				02															41	2
125	851	RC PCS Airflow 2 Status				02															41	2
126	851	RC PCS Airflow 1 Status				02															41	2
127	851	RC SCS Airflow 1 Status				02															41	2
128	851	RC PDS Airflow 1 Status				02															41	2
129	851	RC IFEA Coolant Flow #2 Status				02															41	2
130	851	RC IFEA Coolant Flow #1 Status				02															41	2
131	851	RC TC Group B Calibration Type S				02															41	2
132	851	RC TC Group B Calibration Type K				02															41	2
133	851	RC Hot Guard Heater Ctl Temp 2				02															41	2
134	851	RC TC Group B Calibration Type B				02															41	2
135	851	RC Hot Main Red Htr Ctl Temp 2				02															41	2
136	851	RC Hot Main Prim Htr Ctl Temp 2				02															41	2
137	851	RC Cold Main Prim Htr Ctl Temp 2				02															41	2
138	851	RC Booster Heater Ctl Temp 2				02															41	2
139	851	RC TC Group A Calibration Type K				02															41	2
140	851	RC Cold Guard Heater Ctl Temp 2				02															41	2
141	851	RC TC Group A Calibration Type B				02															41	2
142	851	RC TC Group A Calibration Type S				02															41	2
143	851	RC Hot Main Prim Htr Ctl Temp 1				02															41	2
144	851	RC Cold Main Red Htr Ctl Temp 1				02															41	2
145	851	RC TC Group C Calibration Type K				02															41	2
146	851	RC Hot Main Red Htr Ctl Temp 1				02															41	2
147	851	RC TC Group C Calibration Type B				02															41	2
148	851	RC TC Group C Calibration Type S				02															41	2

0 0 3	0 6 7		3 4 9 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 35 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O/G F I X	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ EVN T	C A E X C P	L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
149	851	RC	Booster Heater Ctl Temp 1			02															41	2
150	851	RC	Hot Guard Heater Ctl Temp 1			02															41	2
151	851	RC	Cold Guard Heater Ctl Temp 1			02															41	2
152	851	RC	Cold Main Prim Htr Ctl Temp 1			02															41	2
153	851	RC	TC Group D Calibration Type S			02															41	2
154	851	RC	TC Group D Calibration Type K			02															41	2
155	851	RC	Cold Main Red Htr Ctl Temp 2			02															41	2
156	851	RC	TC Group D Calibration Type B			02															41	2
157	851	RC	Sample 2 Temp 1			02															41	2
158	851	RC	Sample 1 Temp 1			02															41	2
159	851	RC	Sample 4 Temp 1			02															41	2
160	851	RC	Sample 3 Temp 1			02															41	2
161	851	RC	Sample 6 Temp 1			02															41	2
162	851	RC	Sample 5 Temp 1			02															41	2
163	851	RC	Sample 2 Temp 2			02															41	2
164	851	RC	Sample 1 Temp 2			02															41	2
165	851	RC	Sample 4 Temp 2			02															41	2
166	851	RC	Sample 3 Temp 2			02															41	2
167	851	RC	Sample 6 Temp 2			02															41	2
168	851	RC	Sample 5 Temp 2			02															41	2
169	851	RC	Sample 2 Temp 3			02															41	2
170	851	RC	Sample 1 Temp 3			02															41	2
171	851	RC	Sample 4 Temp 3			02															41	2
172	851	RC	Sample 3 Temp 3			02															41	2
173	851	RC	Sample 6 Temp 3			02															41	2
174	851	RC	Sample 5 Temp 3			02															41	2
175	851	RC	Sample 2 Temp 4			02															41	2
176	851	RC	Sample 1 Temp 4			02															41	2
177	851	RC	Sample 4 Temp 4			02															41	2
178	851	RC	Sample 3 Temp 4			02															41	2

0 3	0 0 6 7	3 4 9 0	4 4 3 5	4 4 7 8	5 5 1 3	5 5 5 7	6 6 6 5 6 7	7 7 1 2	7 7 5 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 36 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L E V C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
179	851	RC	Sample 6 Temp 4			02														41	2
180	851	RC	Sample 5 Temp 4			02														41	2
181	851	RC	Sample 2 Temp 5			02														41	2
182	851	RC	Sample 1 Temp 5			02														41	2
183	851	RC	Sample 4 Temp 5			02														41	2
184	851	RC	Sample 3 Temp 5			02														41	2
185	851	RC	Sample 6 Temp 5			02														41	2
186	851	RC	Sample 5 Temp 5			02														41	2
187	851	RC	Sample 2 Temp 6			02														41	2
188	851	RC	Sample 1 Temp 6			02														41	2
189	851	RC	Sample 4 Temp 6			02														41	2
190	851	RC	Sample 3 Temp 6			02														41	2
191	851	RC	Sample 5 Temp 6			02														41	2
192	851	RC	Sample 6 Temp 6			02														41	2
193	851	RC	IFEA Water Inlet Temp			02														41	2
194	851	RC	IFEA Water Outlet Temp			02														41	2
195	851	RC	RFM Hot End Shell Temp			02														41	2
196	851	RC	RFM Cold End Shell Temp			02														41	2
197	851	RC	Hot Zone CJ Block Temp 1			02														41	2
198	851	RC	Hot Zone CJ Block Temp 2			02														41	2
199	851	RC	Cold Zone CJ Block Temp 2			02														41	2
200	851	RC	Cold Zone CJ Block Temp 1			02														41	2
201	851	RC	Sample 1 CJ Block Temp 1			02														41	2
202	851	RC	RFM Water Outlet Temp			02														41	2
203	851	RC	Sample 2 CJ Block Temp 1			02														41	2
204	851	RC	Sample 1 CJ Block Temp 2			02														41	2
205	851	RC	Sample 3 CJ Block Temp 1			02														41	2
206	851	RC	Sample 2 CJ Block Temp 2			02														41	2
207	851	RC	Sample 4 CJ Block Temp 1			02														41	2
208	851	RC	Sample 3 CJ Block Temp 2			02														41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 37 of 38)

ENT NO.	CONR.	NO.	DESCRIPTION	CMDU	MSAG	MNSOG.	NMOS/GW D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ EVN T	C A L . X C P F	////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
209	851	RC Sample 5 CJ Block Temp 1			02															41	2
210	851	RC Sample 4 CJ Block Temp 2			02															41	2
211	851	RC Sample 6 CJ Block Temp 1			02															41	2
212	851	RC Sample 5 CJ Block Temp 2			02															41	2
213	851	RC Ampoule Alignment Arm Temp			02															41	2
214	851	RC Sample 6 CJ Block Temp 2			02															41	2
215	851	RC FTS Stepping Motor Temp			02															41	2
216	851	RC SEM Track Temp			02															41	2
217	851	RC IFEA Upper Atmosphere Temp			02															41	2
218	851	RC IFEA Lower Atmosphere Temp			02															41	2
219	851	RC RTD Mux 1 Calibration - Low			02															41	2
220	851	RC RTD Mux 1 Calibration - High			02															41	2
221	851	RC RTD Mux 2 Calibration - Low			02															41	2
222	851	RC RTD Mux 2 Calibration - High			02															41	2
223	851	RC RTD Mux 3 Calibration - Low			02															41	2
224	851	RC RTD Mux 3 Calibration - High			02															41	2
225	851	RC RTD Mux 4 Calibration - Low			02															41	2
226	851	RC RTD Mux 4 Calibration - High			02															41	2
227	851	RC RTD Mux 5 Calibration - Low			02															41	2
228	851	RC RTD Mux 5 Calibration - High			02															41	2
229	851	RC RTD Mux 6 Calibration - Low			02															41	2
230	851	RC RTD Mux 6 Calibration - High			02															41	2
231	851	RC RTD Mux 7 Calibration - Low			02															41	2
232	851	RC RTD Mux 7 Calibration - High			02															41	2
233	851	RC RTD Mux 8 Calibration - Low			02															41	2
234	851	RC RTD Mux 8 Calibration - High			02															41	2
235	851	RC Cold Guard Heater Current			02															41	2
236	851	RC Cold Guard Heater Voltage			02															41	2
237	851	RC Cold Main Primary Heater Cur			02															41	2
238	851	RC Cold Main Primary Heater Volt			02															41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 38 of 38)

ENT NO.	CON NO.	DESCRIPTION	CMD GEN	USAGE	MNSOG.	NMOS/GD	SOI/S	TYP E	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY PE	MON REQ ---EVN TPF	CAL ---LEX COF	////////////// CID IT?	RCIO DE	SID NO.	EX PI DE	TA BI LE
239	851	RC Cold Main Red Heater Current			02														41	2
240	851	RC Cold Main Red Heater Voltage			02														41	2
241	851	RC Hot Boost Heater Current			02														41	2
242	851	RC Hot Boost Heater Voltage			02														41	2
243	851	RC Hot Guard Heater Current			02														41	2
244	851	RC Hot Guard Heater Voltage			02														41	2
245	851	RC Hot Main Primary Heater Cur			02														41	2
246	851	RC Hot Main Primary Heater Volt			02														41	2
247	851	RC Hot Main Red Heater Current			02														41	2
248	851	RC Hot Main Red Heater Voltage			02														41	2
249	851	RC Stepping Motor Phase A Cur			02														41	2
250	851	RC Stepping Motor Phase A Volt			02														41	2
251	851	RC Stepping Motor Phase B Cur			02														41	2
252	851	RC Stepping Motor Phase B Volt			02														41	2
253	851	RC Indexing CAM Rotary Position			02														41	2
254	851	RC Furnace Linear Position			02														41	2
255	851	RC IFEA Lower Humidity			02														41	2
256	851	RC Rapid Translation Motor RPM			02														41	2
257	851	RC IFEA Absolute Pressure 1			02														41	2
258	851	RC IFEA Upper Humidity			02														41	2
259	851	RC Experiment Main Bus Current			02														41	2
260	851	RC IFEA Absolute Pressure 2			02														41	2
261	851	RC SMS Board Velocity Reading			02														41	2
262	851	RC Experiment Main Bus Voltage			02														41	2
263	851	Process Elapsed Time - Seconds			02														41	2
264	851	Go/NoGo Error Override			02														41	2
265	851	CGF Sytstem State			02														41	2
266	851	Auto Pressure Ctl			02														41	2

003	006	007	034	035	044	045	047	048	051	053	055	057	065	066	067	071	072	075	078	080

TABLE 1.7-3. EVENT/EXCEPTION MONITOR REQUIREMENTS

ENT NUM	CONT OBR NUM	EMR XOA CNT PIE TT IO OR N	MONITOR VALUES UPPER LIMIT	MONITOR VALUES LOWER LIMIT/ EXPT'D STATE	MSG GEN CLASS	MESSAGE (HIGH/SINGLE)	ERROR MSG. GEN	ERROR MSG. NUM	MESSAGE LOW	ERROR MSG. GEN	ERROR MSG. NUM	INTERFACE TYPE	INTERFACE MEDIUM	OCCURRENCE TUNING	OCCURRENCE 3PIECE	EXPECTED EXCEPTION	EXPECTED EXCEPTION
207	106	001	-073	-128	1	HI WATER TEMP	41	14		41		300	10	CGF		41	4
208	106	001	-077	-128	1	HI HUMIDITY LWR	41	16		41		300	10	CGF		41	4
209	106	001	-077	-128	1	HI HUMIDITY UPR	41	18		41		300	10	CGF		41	4
210	106	001	-004	-128	1	HI ATMOS TEMP	41	1A		41		300	10	MAN		41	4
211	106	001	-073	-128	1	HI CLD END TEMP	41	1C		41		300	10	MAN		41	4
212	106	001	-073	-128	1	HI HOT END TEMP	41	1E		41		300	10	MAN		41	4
215	106	001	-009	-073	1	HI IFEA PRES 1	41	20	LO IFEA PRES 1	41	21	300	10	CGF		41	4
216	106	001	-009	-073	1	HI IFEA PRES 2	41	22	LO IFEA PRES 2	41	23	300	10	CGF		41	4
219	106	001	+105	-128	1	HI MAIN CURRENT	41	24		41		300	10	CGF		41	4
220	106	001	+076	+018	1	HI MAIN VOLTAGE	41	26	LO MAIN VOLTAGE	41	27	300	10	CGF		41	4
223	106	001		1	1	LO WATER FLOW	41	28		41		300	05	CGF		41	4
224	106	001		1	1	LO WATER FLOW	41	2A		41		300	05	CGF		41	4
237	106	001		1	1	NO AVIONICS AIR	41	2C		41		300	05	CGF		41	4
238	106	001		1	1	NO AVIONICS AIR	41	2E		41		300	05	CGF		41	4
239	106	001		1	1	NO AVIONICS AIR	41	30		41		300	05	CGF		41	4
240	106	001		1	1	NO AVIONICS AIR	41	32		41		300	05	CGF		41	4
265	106	001		1	1	WTR OUT BYPASS	41	34		41		300	05	MAN		41	4
266	106	001		0	1	WTR OUT BYPASS	41	36		41		300	05	MAN		41	4
267	106	001		1	1	WTR IN BYPASS	41	38		41		300	05	MAN		41	4
268	106	001		0	1	WTR IN BYPASS	41	3A		41		300	05	MAN		41	4
287	106	001		1	1	EXTRM TRVL LIM	41	3C		41		300	05	FTS		41	4
288	106	001		0	1	EXTRM TRVL LIM	41	3E		41		300	05	FTS		41	4
319	106	001		0	1	EXP BUS PWR OFF	41	40		41		300	05	CGF		41	4
320	106	001		1	1	EXP BUS PWR OFF	41	42		41		300	05	CGF		41	4

ENT NUM	CONT OBR NUM	EMR XOA CNT PIE TT IO OR N	MONITOR VALUES UPPER LIMIT	MONITOR VALUES LOWER LIMIT/ EXPT'D STATE	MSG GEN CLASS	MESSAGE (HIGH/SINGLE)	ERROR MSG. GEN	ERROR MSG. NUM	MESSAGE LOW	ERROR MSG. GEN	ERROR MSG. NUM	INTERFACE TYPE	INTERFACE MEDIUM	OCCURRENCE TUNING	OCCURRENCE 3PIECE	EXPECTED EXCEPTION	EXPECTED EXCEPTION
0 3	0 6	0 9	1 7	2 5	2 6	2 7	4 3	4 5	4 6	6 2	6 4	6 7	6 9	7 2		7 9	8 0

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 1 of 20)

ENTRY	NUMBER	CONTROL	NOMENCLATURE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE ID
				A0	A1	A2	A3	A4	A5		
001	850	PC		+0000000+00	+1000000+01					41	6
002	850	PC		+0000000+00	+1000000+01					41	6
003	850	PC		+0000000+00	+1000000+01					41	6
004	850	PC		+0000000+00	+1000000+01					41	6
005	850	PC		+0000000+00	+1000000+01					41	6
138	850	PC		+0000000+00	+1000000+01					41	6
139	850	PC		+0000000+00	+1000000+01					41	6
140	850	PC		+0000000+00	+1000000+01					41	6
141	850	PC		+0000000+00	+1000000+01					41	6
142	850	PC		+0000000+00	+1000000+01					41	6
143	850	PC		+0000000+00	+1000000+01					41	6
144	850	PC		+0000000+00	+1000000+01					41	6
145	850	PC		+0000000+00	+1000000+01					41	6
146	850	PC		+0000000+00	+1000000+01					41	6
147	850	PC		+0000000+00	+1000000+01					41	6
148	850	PC		+0000000+00	+1000000+01					41	6
149	850	PC		+0000000+00	+1000000+01					41	6
150	850	PC		+0000000+00	+1000000+01					41	6
151	850	PC		+0000000+00	+1000000+01					41	6
152	850	PC		+0000000+00	+1000000+01					41	6
153	850	PC		+0000000+00	+1000000+01					41	6
154	850	PC		+0000000+00	+1000000+01					41	6
155	850	PC		+0000000+00	+1000000+01					41	6
156	850	PC		+0000000+00	+1000000+01					41	6
157	850	PC		+0000000+00	+1000000+01					41	6
158	850	PC		+0000000+00	+1000000+01					41	6
159	850	PC		+0000000+00	+1000000+01					41	6
160	850	PC		+0000000+00	+1000000+01					41	6
161	850	PC		+0000000+00	+1000000+01					41	6
162	850	PC		+0000000+00	+1000000+01					41	6
163	850	PC		+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 2 of 20)

ENTRY	NUMBER	CONVERSION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////
			A0	A1	A2	A3	A4	A5	EXP
164	850	PC	+0000000+00	+1000000+01					41 6
165	850	PC	+0000000+00	+1000000+01					41 6
166	850	PC	+0000000+00	+1000000+01					41 6
167	850	PC	+0000000+00	+1000000+01					41 6
168	850	PC	+0000000+00	+1000000+01					41 6
169	850	PC	+0000000+00	+1000000+01					41 6
170	850	PC	+0000000+00	+1000000+01					41 6
171	850	PC	+0000000+00	+1000000+01					41 6
172	850	PC	+0000000+00	+1000000+01					41 6
173	850	PC	+0000000+00	+1000000+01					41 6
174	850	PC	+0000000+00	+1000000+01					41 6
175	850	PC	+0000000+00	+1000000+01					41 6
176	850	PC	+0000000+00	+1000000+01					41 6
177	850	PC	+0000000+00	+1000000+01					41 6
178	850	PC	+0000000+00	+1000000+01					41 6
179	850	PC	+0000000+00	+1000000+01					41 6
180	850	PC	+0000000+00	+1000000+01					41 6
181	850	PC	+0000000+00	+1000000+01					41 6
182	850	PC	+0000000+00	+1000000+01					41 6
183	850	PC	+0000000+00	+1000000+01					41 6
184	850	PC	+0000000+00	+1000000+01					41 6
185	850	PC	+0000000+00	+1000000+01					41 6
187	850	PC	+0000000+00	+1000000+01					41 6
188	850	PC	+0000000+00	+1000000+01					41 6
189	850	PC	+0000000+00	+1000000+01					41 6
190	850	PC	+0000000+00	+1000000+01					41 6
191	850	PC	+0000000+00	+1000000+01					41 6
192	850	PC	+0000000+00	+1000000+01					41 6
193	850	PC	+0000000+00	+1000000+01					41 6
194	850	PC	+0000000+00	+1000000+01					41 6
195	850	PC	+0000000+00	+1000000+01					41 6

ENTRY	NUMBER	CONVERSION									
0 3	0 5	0 7	1 8	2 9	4 0	5 1	6 2	7 3	7 9	8 0	

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 3 of 20)

ENTRY	NUMBER	CONTROL	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	BIAS
					A0	A1	A2	A3	A4	A5		
196	850	PC			+0000000+00	+5000000-01					41	6
197	850	PC			+0000000+00	+5000000-01					41	6
198	850	PC			+0000000+00	+5000000-01					41	6
199	850	PC			+0000000+00	+5000000-01					41	6
200	850	PC			+0000000+00	+5000000-01					41	6
201	850	PC			+0000000+00	+5000000-01					41	6
202	850	PC			+0000000+00	+5000000-01					41	6
203	850	PC			+0000000+00	+5000000-01					41	6
204	850	PC			+0000000+00	+5000000-01					41	6
205	850	PC			+0000000+00	+5000000-01					41	6
206	850	PC			+0000000+00	+5000000-01					41	6
207	850	PC			+0000000+00	+5000000-01					41	6
208	850	PC			+0000000+00	+5000000-01					41	6
209	850	PC			+0000000+00	+5000000-01					41	6
210	850	PC			+0000000+00	+5000000-01					41	6
211	850	PC			+0000000+00	+5000000-01					41	6
212	850	PC			+0000000+00	+3663000-01					41	6
213	850	PC			+0000000+00	+9768000-02					41	6
214	850	PC			+0000000+00	+2442000-01					41	6
215	850	PC			+0000000+00	+2442000-01					41	6
216	850	PC			+0000000+00	+7326000-02					41	6
217	850	PC			+0000000+00	+7326000-02					41	6
218	850	PC			-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
219	850	PC			-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
220	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
221	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
222	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
223	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
224	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
225	850	PC			+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
226	850	PC			+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 4 of 20)

ENTRY	UNIT	CONTROL BLOCK	CONTROL BLOCK	CONTROL BLOCK	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	EXPONENT
					A0	A1	A2	A3	A4	A5		
227	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
228	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
229	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
230	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
231	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
232	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
233	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
234	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
235	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
236	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
237	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
238	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
239	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
240	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
241	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
242	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
243	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
244	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
245	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
246	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
247	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
248	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
249	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
250	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
251	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
252	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
253	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
254	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06			41	6
255	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
256	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6
257	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02			41	6

035	057	180	291	402	513	624	735	79	80

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 5 of 20)

ENTRY	UNIT	CONTROL BLOCK	CONTROL ACTION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE LENGTH
				A0	A1	A2	A3	A4	A5		
258	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
259	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
260	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
261	850	PC		+0000000+00	+1743900-02						41 6
262	850	PC		+0000000+00	+5086300-02						41 6
263	850	PC		+0000000+00	+1743900-02						41 6
264	850	PC		+0000000+00	+5086300-02						41 6
265	850	PC		-2566000+01	+1364100+00						41 6
266	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
267	850	PC		+0000000+00	+1627600+01						41 6
268	850	PC		+0000000+00	+7326000-02						41 6
269	850	PC		+0000000+00	+1953600-01						41 6
270	850	PC		+0000000+00	+7326000-02						41 6
271	850	PC		+0000000+00	+1953600-01						41 6
272	850	PC		+0000000+00	+7326000-02						41 6
273	850	PC		+0000000+00	+1953600-01						41 6
274	850	PC		+0000000+00	+7326000-02						41 6
275	850	PC		+0000000+00	+1953600-01						41 6
276	850	PC		+0000000+00	+7326000-02						41 6
277	850	PC		+0000000+00	+1953600-01						41 6
278	850	PC		+0000000+00	+7326000-02						41 6
279	850	PC		+0000000+00	+1953600-01						41 6
280	850	PC		+0000000+00	+7326000-02						41 6
281	850	PC		+0000000+00	+1953600-01						41 6
282	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
283	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
284	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
285	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
286	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
287	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
288	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 6 of 20)

ENTRY	NUMBER	CONVERSION	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
				A0	A1	A2	A3	A4	A5	EXP	TABLE
289	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
290	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
291	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
292	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
293	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
294	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
295	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
296	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
297	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
298	850	PC		+0000000+00	+1000000+01					41	6
299	850	PC		+0000000+00	+1000000+01					41	6
300	850	PC		+0000000+00	+1000000+01					41	6
301	850	PC		+0000000+00	+1000000+01					41	6
302	850	PC		+0000000+00	+1000000+01					41	6
303	850	PC		+0000000+00	+1000000+01					41	6
304	850	PC		+0000000+00	+1000000+01					41	6
305	850	PC		+0000000+00	+1000000+01					41	6
306	850	PC		+0000000+00	+1000000+01					41	6
307	850	PC		+0000000+00	+1000000+01					41	6
308	850	PC		+0000000+00	+1000000+01					41	6
309	850	PC		+0000000+00	+1000000+01					41	6
310	850	PC		+0000000+00	+1000000+01					41	6
311	850	PC		+0000000+00	+1000000+01					41	6
312	850	PC		+0000000+00	+8302800-01					41	6
313	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
314	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
315	850	PC		+9760000+03	+2442000+00					41	6
316	850	PC		+9760000+03	+2442000+00					41	6
317	850	PC		+9760000+03	+2442000+00					41	6
318	850	PC		+9760000+03	+2442000+00					41	6
319	850	PC		+9760000+03	+2442000+00					41	6

03	05	07	18	29	40	51	62	73	79	80

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 7 of 20)

ENTRY	NUMBER	CONTROL	NCT	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
				A0	A1	A2	A3	A4	A5	EXP	TABLE
320	850	PC		+9760000+03	+2442000+00					41	6
321	850	PC		+6810000+02	+2442000-01					41	6
322	850	PC		+6810000+02	+2442000-01					41	6
323	850	PC		+9760000+03	+2442000+00					41	6
324	850	PC		+9760000+03	+2442000+00					41	6
325	850	PC		+9760000+03	+2442000+00					41	6
326	850	PC		+9760000+03	+2442000+00					41	6
327	850	PC		+9760000+03	+2442000+00					41	6
328	850	PC		+9760000+03	+2442000+00					41	6
329	850	PC		+6810000+02	+2442000-01					41	6
330	850	PC		+6810000+02	+2442000-01					41	6
331	850	PC		+0000000+00	+1000000+01					41	6
332	850	PC		+0000000+00	+3125000+00					41	6
333	850	PC		+0000000+00	+2500000+00					41	6
334	850	PC		+0000000+00	+1000000+01					41	6
335	850	PC		+0000000+00	+3125000+00					41	6
336	850	PC		+0000000+00	+2500000+00					41	6
337	850	PC		+0000000+00	+1000000+01					41	6
338	850	PC		+0000000+00	+3125000+00					41	6
339	850	PC		+0000000+00	+2500000+00					41	6
340	850	PC		+0000000+00	+1000000+01					41	6
341	850	PC		+0000000+00	+3125000+00					41	6
342	850	PC		+0000000+00	+2500000+00					41	6
343	850	PC		+0000000+00	+7096670-04					41	6
344	850	PC		+0000000+00	+1000000+01					41	6
345	850	PC		+0000000+00	+1000000+01					41	6
346	850	PC		+0000000+00	+1000000+01					41	6
347	850	PC		+0000000+00	+1000000+01					41	6
348	850	PC		+0000000+00	+1000000+01					41	6
349	850	PC		+0000000+00	+1000000+01					41	6
350	850	PC		+0000000+00	+1000000+01					41	6
03	05	07		18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 8 of 20)

ENTRY	UMB	ROR	NCOAY LIB RAT IO N	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						///// EXP	TAB LB ID
				A0	A1	A2	A3	A4	A5		
352	850		PC	+0000000+00	+1000000+01						41 6
353	850		PC	+0000000+00	+1000000+01						41 6
354	850		PC	+0000000+00	+1000000+01						41 6
356	850		PC	+0000000+00	+1000000+01						41 6
357	850		PC	+0000000+00	+1000000+01						41 6
358	850		PC	+0000000+00	+1000000+01						41 6
360	850		PC	+0000000+00	+1000000+01						41 6
361	850		PC	+0000000+00	+1000000+01						41 6
362	850		PC	+0000000+00	+1000000+01						41 6
363	850		PC	+0000000+00	+1000000+01						41 6
364	850		PC	+0000000+00	+1000000+01						41 6
365	850		PC	+0000000+00	+1000000+01						41 6
366	850		PC	+0000000+00	+1000000+01						41 6
369	850		PC	+0000000+00	+1000000+01						41 6
370	850		PC	+0000000+00	+1000000+01						41 6
371	850		PC	+0000000+00	+1000000+01						41 6
372	850		PC	+0000000+00	+1000000+01						41 6
373	850		PC	+0000000+00	+1000000+01						41 6
374	850		PC	+0000000+00	+1000000+01						41 6
377	850		PC	+0000000+00	+1000000+01						41 6
378	850		PC	+0000000+00	+1000000+01						41 6
379	850		PC	+0000000+00	+1000000+01						41 6
380	850		PC	+0000000+00	+1000000+01						41 6
381	850		PC	+0000000+00	+1000000+01						41 6
382	850		PC	+0000000+00	+1000000+01						41 6
385	850		PC	+0000000+00	+1000000+01						41 6
386	850		PC	+0000000+00	+1000000+01						41 6
387	850		PC	+0000000+00	+1000000+01						41 6
388	850		PC	+0000000+00	+1000000+01						41 6
389	850		PC	+0000000+00	+1000000+01						41 6
390	850		PC	+0000000+00	+1000000+01						41 6
03	05	07		18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 9 of 20)

ENTRY	NUMBER	COORDINATE	CTAYLPIEB	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
				A0	A1	A2	A3	A4	A5	EXPONENT	TABLE
391	850	PC		+0000000+00	+1000000+01					41	6
392	850	PC		+0000000+00	+1000000+01					41	6
393	850	PC		+0000000+00	+1000000+01					41	6
394	850	PC		+0000000+00	+1000000+01					41	6
395	850	PC		+0000000+00	+1000000+01					41	6
396	850	PC		+0000000+00	+1000000+01					41	6
397	850	PC		+0000000+00	+1000000+01					41	6
398	850	PC		+0000000+00	+1000000+01					41	6
399	850	PC		+0000000+00	+1000000+01					41	6
400	850	PC		+0000000+00	+1000000+01					41	6
401	850	PC		+0000000+00	+1000000+01					41	6
402	850	PC		+0000000+00	+1000000+01					41	6
403	850	PC		+0000000+00	+1000000+01					41	6
404	850	PC		+0000000+00	+1000000+01					41	6
405	850	PC		+0000000+00	+1000000+01					41	6
406	850	PC		+0000000+00	+1000000+01					41	6
407	850	PC		+0000000+00	+1000000+01					41	6
408	850	PC		+0000000+00	+1000000+01					41	6
409	850	PC		+0000000+00	+1000000+01					41	6
410	850	PC		+0000000+00	+1000000+01					41	6
411	850	PC		+0000000+00	+1000000+01					41	6
412	850	PC		+0000000+00	+1000000+01					41	6
413	850	PC		+0000000+00	+1000000+01					41	6
414	850	PC		+0000000+00	+1000000+01					41	6
415	850	PC		+0000000+00	+1000000+01					41	6
417	850	PC		+0000000+00	+1000000+01					41	6
418	850	PC		+0000000+00	+1000000+01					41	6
419	850	PC		+0000000+00	+1000000+01					41	6
421	850	PC		+0000000+00	+1000000+01					41	6
422	850	PC		+0000000+00	+1000000+01					41	6
423	850	PC		+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 10 of 20)

ENTRY	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPAND
			A0	A1	A2	A3	A4	A5	
425	850	PC	+0000000+00	+1000000+01					41 6
427	850	PC	+0000000+00	+1000000+01					41 6
428	850	PC	+0000000+00	+1000000+01					41 6
429	850	PC	+0000000+00	+1000000+01					41 6
431	850	PC	+0000000+00	+1000000+01					41 6
432	850	PC	+0000000+00	+1000000+01					41 6
433	850	PC	+0000000+00	+1000000+01					41 6
435	850	PC	+0000000+00	+1000000+01					41 6
437	850	PC	+0000000+00	+1000000+01					41 6
438	850	PC	+0000000+00	+1000000+01					41 6
439	850	PC	+0000000+00	+1000000+01					41 6
441	850	PC	+0000000+00	+1000000+01					41 6
442	850	PC	+0000000+00	+1000000+01					41 6
443	850	PC	+0000000+00	+1000000+01					41 6
445	850	PC	+0000000+00	+1000000+01					41 6
447	850	PC	+0000000+00	+1000000+01					41 6
448	850	PC	+0000000+00	+1000000+01					41 6
449	850	PC	+0000000+00	+1000000+01					41 6
451	850	PC	+0000000+00	+1000000+01					41 6
452	850	PC	+0000000+00	+1000000+01					41 6
453	850	PC	+0000000+00	+1000000+01					41 6
455	850	PC	+0000000+00	+1000000+01					41 6
457	850	PC	+0000000+00	+1000000+01					41 6
458	850	PC	+0000000+00	+1000000+01					41 6
459	850	PC	+0000000+00	+1000000+01					41 6
461	850	PC	+0000000+00	+1000000+01					41 6
462	850	PC	+0000000+00	+1000000+01					41 6
463	850	PC	+0000000+00	+1000000+01					41 6
470	850	PC	+0000000+00	+1000000+01					41 6
471	850	PC	+0000000+00	+1000000+01					41 6
472	850	PC	+0000000+00	+1000000+01					41 6

0 3	0 5	0 7	1 8	2 9	4 0	5 1	6 2	7 3	7 9	8 0

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 11 of 20)

ENTRY	NUMBER	CONTROL BYTE	NUMBER OF LINEAR SEGMENTS	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
				A0	A1	A2	A3	A4	A5	EXP	TABLE ID
473	850	PC		+0000000+00	+1000000+01					41	6
474	850	PC		+0000000+00	+1000000+01					41	6
475	850	PC		+0000000+00	+1000000+01					41	6
476	850	PC		+0000000+00	+1000000+01					41	6
477	850	PC		+0000000+00	+1000000+01					41	6
478	850	PC		+0000000+00	+1000000+01					41	6
479	850	PC		+0000000+00	+1000000+01					41	6
480	850	PC		+0000000+00	+1000000+01					41	6
481	850	PC		+0000000+00	+1000000+01					41	6
482	850	PC		+0000000+00	+1000000+01					41	6
483	850	PC		+0000000+00	+1000000+01					41	6
484	850	PC		+0000000+00	+1000000+01					41	6
485	850	PC		+0000000+00	+1000000+01					41	6
486	850	PC		+0000000+00	+1000000+01					41	6
487	850	PC		+0000000+00	+1000000+01					41	6
488	850	PC		+0000000+00	+1000000+01					41	6
001	851	PC		+0000000+00	+1000000+01					41	6
002	851	PC		+0000000+00	+1000000+01					41	6
003	851	PC		+0000000+00	+1000000+01					41	6
004	851	PC		+0000000+00	+1000000+01					41	6
005	851	PC		+0000000+00	+1000000+01					41	6
006	851	PC		+0000000+00	+1000000+01					41	6
007	851	PC		+0000000+00	+1000000+01					41	6
008	851	PC		+0000000+00	+1000000+01					41	6
009	851	PC		+0000000+00	+1000000+01					41	6
010	851	PC		+0000000+00	+1000000+01					41	6
011	851	PC		+0000000+00	+1000000+01					41	6
012	851	PC		+0000000+00	+1000000+01					41	6
013	851	PC		+0000000+00	+1000000+01					41	6
014	851	PC		+0000000+00	+1000000+01					41	6
015	851	PC		+0000000+00	+1000000+01					41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 12 of 20)

ENTRY	NUMBER	CONTROL BLOCK	CONTROL OPERATION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
				A0	A1	A2	A3	A4	A5	EXP	TABLE
016	851	PC		+0000000+00	+1000000+01					41	6
017	851	PC		+0000000+00	+1000000+01					41	6
018	851	PC		+0000000+00	+1000000+01					41	6
019	851	PC		+0000000+00	+1000000+01					41	6
020	851	PC		+0000000+00	+1000000+01					41	6
021	851	PC		+0000000+00	+1000000+01					41	6
022	851	PC		+0000000+00	+1000000+01					41	6
023	851	PC		+0000000+00	+1000000+01					41	6
024	851	PC		+0000000+00	+1000000+01					41	6
025	851	PC		+0000000+00	+1000000+01					41	6
026	851	PC		+0000000+00	+1000000+01					41	6
027	851	PC		+0000000+00	+1000000+01					41	6
028	851	PC		+0000000+00	+1000000+01					41	6
029	851	PC		+0000000+00	+1000000+01					41	6
030	851	PC		+0000000+00	+1000000+01					41	6
031	851	PC		+0000000+00	+1000000+01					41	6
032	851	PC		+0000000+00	+1000000+01					41	6
033	851	PC		+0000000+00	+1000000+01					41	6
034	851	PC		+0000000+00	+1000000+01					41	6
035	851	PC		+0000000+00	+1000000+01					41	6
036	851	PC		+0000000+00	+1000000+01					41	6
037	851	PC		+0000000+00	+1000000+01					41	6
038	851	PC		+0000000+00	+1000000+01					41	6
039	851	PC		+0000000+00	+1000000+01					41	6
040	851	PC		+0000000+00	+1000000+01					41	6
041	851	PC		+0000000+00	+1000000+01					41	6
042	851	PC		+0000000+00	+1000000+01					41	6
043	851	PC		+0000000+00	+1000000+01					41	6
044	851	PC		+0000000+00	+1000000+01					41	6
045	851	PC		+0000000+00	+1000000+01					41	6
046	851	PC		+0000000+00	+1000000+01					41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 13 of 20)

ENTRY	NUMBER	COMMAND	NOUN	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
				A0	A1	A2	A3	A4	A5	EXP	TABLE
047	851	PC		+0000000+00	+1000000+01					41	6
048	851	PC		+0000000+00	+1000000+01					41	6
049	851	PC		+0000000+00	+1000000+01					41	6
050	851	PC		+0000000+00	+1000000+01					41	6
051	851	PC		+0000000+00	+1000000+01					41	6
052	851	PC		+0000000+00	+1000000+01					41	6
053	851	PC		+0000000+00	+1000000+01					41	6
054	851	PC		+0000000+00	+1000000+01					41	6
055	851	PC		+0000000+00	+1000000+01					41	6
056	851	PC		+0000000+00	+1000000+01					41	6
057	851	PC		+0000000+00	+1000000+01					41	6
058	851	PC		+0000000+00	+1000000+01					41	6
059	851	PC		+0000000+00	+1000000+01					41	6
060	851	PC		+0000000+00	+1000000+01					41	6
061	851	PC		+0000000+00	+1000000+01					41	6
062	851	PC		+0000000+00	+1000000+01					41	6
063	851	PC		+0000000+00	+1000000+01					41	6
064	851	PC		+0000000+00	+1000000+01					41	6
065	851	PC		+0000000+00	+1000000+01					41	6
066	851	PC		+0000000+00	+1000000+01					41	6
067	851	PC		+0000000+00	+1000000+01					41	6
068	851	PC		+0000000+00	+1000000+01					41	6
069	851	PC		+0000000+00	+1000000+01					41	6
070	851	PC		+0000000+00	+1000000+01					41	6
071	851	PC		+0000000+00	+1000000+01					41	6
072	851	PC		+0000000+00	+1000000+01					41	6
073	851	PC		+0000000+00	+1000000+01					41	6
074	851	PC		+0000000+00	+1000000+01					41	6
075	851	PC		+0000000+00	+1000000+01					41	6
076	851	PC		+0000000+00	+1000000+01					41	6
077	851	PC		+0000000+00	+1000000+01					41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 14 of 20)

ENTRY	NUMBER	CONTROL	NOUN	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE
				A0	A1	A2	A3	A4	A5		
078	851	PC	+0000000+00	+1000000+01						41	6
079	851	PC	+0000000+00	+1000000+01						41	6
080	851	PC	+0000000+00	+1000000+01						41	6
081	851	PC	+0000000+00	+1000000+01						41	6
082	851	PC	+0000000+00	+1000000+01						41	6
083	851	PC	+0000000+00	+1000000+01						41	6
084	851	PC	+0000000+00	+1000000+01						41	6
085	851	PC	+0000000+00	+1000000+01						41	6
086	851	PC	+0000000+00	+1000000+01						41	6
087	851	PC	+0000000+00	+1000000+01						41	6
088	851	PC	+0000000+00	+1000000+01						41	6
089	851	PC	+0000000+00	+1000000+01						41	6
090	851	PC	+0000000+00	+1000000+01						41	6
091	851	PC	+0000000+00	+1000000+01						41	6
092	851	PC	+0000000+00	+1000000+01						41	6
093	851	PC	+0000000+00	+1000000+01						41	6
094	851	PC	+0000000+00	+1000000+01						41	6
095	851	PC	+0000000+00	+1000000+01						41	6
096	851	PC	+0000000+00	+1000000+01						41	6
097	851	PC	+0000000+00	+1000000+01						41	6
098	851	PC	+0000000+00	+1000000+01						41	6
099	851	PC	+0000000+00	+1000000+01						41	6
100	851	PC	+0000000+00	+1000000+01						41	6
101	851	PC	+0000000+00	+1000000+01						41	6
102	851	PC	+0000000+00	+1000000+01						41	6
103	851	PC	+0000000+00	+1000000+01						41	6
104	851	PC	+0000000+00	+1000000+01						41	6
105	851	PC	+0000000+00	+1000000+01						41	6
106	851	PC	+0000000+00	+1000000+01						41	6
107	851	PC	+0000000+00	+1000000+01						41	6
108	851	PC	+0000000+00	+1000000+01						41	6

03	05	07	18	29	40	51	62	73	79	80

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 15 of 20)

ENTRY NUMBER	MUX ADDR	CONTROL REGISTER	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
			A0	A1	A2	A3	A4	A5	EXP	TABLE LIB ID
109	851	PC	+0000000+00	+1000000+01					41	6
110	851	PC	+0000000+00	+1000000+01					41	6
111	851	PC	+0000000+00	+1000000+01					41	6
112	851	PC	+0000000+00	+1000000+01					41	6
113	851	PC	+0000000+00	+1000000+01					41	6
114	851	PC	+0000000+00	+1000000+01					41	6
115	851	PC	+0000000+00	+1000000+01					41	6
116	851	PC	+0000000+00	+1000000+01					41	6
117	851	PC	+0000000+00	+1000000+01					41	6
118	851	PC	+0000000+00	+1000000+01					41	6
119	851	PC	+0000000+00	+1000000+01					41	6
120	851	PC	+0000000+00	+1000000+01					41	6
121	851	PC	+0000000+00	+1000000+01					41	6
122	851	PC	+0000000+00	+1000000+01					41	6
123	851	PC	+0000000+00	+1000000+01					41	6
124	851	PC	+0000000+00	+1000000+01					41	6
125	851	PC	+0000000+00	+1000000+01					41	6
126	851	PC	+0000000+00	+1000000+01					41	6
127	851	PC	+0000000+00	+1000000+01					41	6
128	851	PC	+0000000+00	+1000000+01					41	6
129	851	PC	+0000000+00	+1000000+01					41	6
130	851	PC	+0000000+00	+1000000+01					41	6
131	851	PC	+0000000+00	+1000000+01					41	6
132	851	PC	+0000000+00	+1000000+01					41	6
133	851	PC	+0000000+00	+1000000+01					41	6
134	851	PC	+0000000+00	+1000000+01					41	6
135	851	PC	+0000000+00	+1000000+01					41	6
136	851	PC	+0000000+00	+1000000+01					41	6
137	851	PC	+0000000+00	+1000000+01					41	6
138	851	PC	+0000000+00	+1000000+01					41	6
139	851	PC	+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 16 of 20)

ENTRY	UNIT	CONV	CONTROL LAYOUT	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						///// EXP	TABLE
				A0	A1	A2	A3	A4	A5		
140	851	PC		+0000000+00	+1000000+01						41 6
141	851	PC		+0000000+00	+1000000+01						41 6
142	851	PC		+0000000+00	+1000000+01						41 6
143	851	PC		+0000000+00	+1000000+01						41 6
144	851	PC		+0000000+00	+1000000+01						41 6
145	851	PC		+0000000+00	+1000000+01						41 6
146	851	PC		+0000000+00	+1000000+01						41 6
147	851	PC		+0000000+00	+1000000+01						41 6
148	851	PC		+0000000+00	+1000000+01						41 6
149	851	PC		+0000000+00	+1000000+01						41 6
150	851	PC		+0000000+00	+1000000+01						41 6
151	851	PC		+0000000+00	+1000000+01						41 6
152	851	PC		+0000000+00	+1000000+01						41 6
153	851	PC		+0000000+00	+1000000+01						41 6
154	851	PC		+0000000+00	+1000000+01						41 6
155	851	PC		+0000000+00	+1000000+01						41 6
156	851	PC		+0000000+00	+1000000+01						41 6
157	851	PC		+0000000+00	+1000000+01						41 6
158	851	PC		+0000000+00	+1000000+01						41 6
159	851	PC		+0000000+00	+1000000+01						41 6
160	851	PC		+0000000+00	+1000000+01						41 6
161	851	PC		+0000000+00	+1000000+01						41 6
162	851	PC		+0000000+00	+1000000+01						41 6
163	851	PC		+0000000+00	+1000000+01						41 6
164	851	PC		+0000000+00	+1000000+01						41 6
165	851	PC		+0000000+00	+1000000+01						41 6
166	851	PC		+0000000+00	+1000000+01						41 6
167	851	PC		+0000000+00	+1000000+01						41 6
168	851	PC		+0000000+00	+1000000+01						41 6
169	851	PC		+0000000+00	+1000000+01						41 6
170	851	PC		+0000000+00	+1000000+01						41 6
03	05	07		18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 17 of 20)

ENTRY	NUMBER	CONVERSION	NUMBER OF CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
			A0	A1	A2	A3	A4	A5	EXPONENT	TABLE ID
171	851	PC	+0000000+00	+1000000+01					41	6
172	851	PC	+0000000+00	+1000000+01					41	6
173	851	PC	+0000000+00	+1000000+01					41	6
174	851	PC	+0000000+00	+1000000+01					41	6
175	851	PC	+0000000+00	+1000000+01					41	6
176	851	PC	+0000000+00	+1000000+01					41	6
177	851	PC	+0000000+00	+1000000+01					41	6
178	851	PC	+0000000+00	+1000000+01					41	6
179	851	PC	+0000000+00	+1000000+01					41	6
180	851	PC	+0000000+00	+1000000+01					41	6
181	851	PC	+0000000+00	+1000000+01					41	6
182	851	PC	+0000000+00	+1000000+01					41	6
183	851	PC	+0000000+00	+1000000+01					41	6
184	851	PC	+0000000+00	+1000000+01					41	6
185	851	PC	+0000000+00	+1000000+01					41	6
186	851	PC	+0000000+00	+1000000+01					41	6
187	851	PC	+0000000+00	+1000000+01					41	6
188	851	PC	+0000000+00	+1000000+01					41	6
189	851	PC	+0000000+00	+1000000+01					41	6
190	851	PC	+0000000+00	+1000000+01					41	6
191	851	PC	+0000000+00	+1000000+01					41	6
192	851	PC	+0000000+00	+1000000+01					41	6
193	851	PC	+0000000+00	+1000000+01					41	6
194	851	PC	+0000000+00	+1000000+01					41	6
195	851	PC	+0000000+00	+1000000+01					41	6
196	851	PC	+0000000+00	+1000000+01					41	6
197	851	PC	+0000000+00	+1000000+01					41	6
198	851	PC	+0000000+00	+1000000+01					41	6
199	851	PC	+0000000+00	+1000000+01					41	6
200	851	PC	+0000000+00	+1000000+01					41	6
201	851	PC	+0000000+00	+1000000+01					41	6

0 3	0 5	0 7	1 8	2 9	4 0	5 1	6 2	7 3	7 9	8 0

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TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 18 of 20)

ENTRY	NUMBER	CONTROL OR INDICATOR	CONTROL/INDICATOR TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						//// EXPONENT	//// TABLE LIBRARY
				A0	A1	A2	A3	A4	A5		
202	851	PC		+0000000+00	+1000000+01					41	6
203	851	PC		+0000000+00	+1000000+01					41	6
204	851	PC		+0000000+00	+1000000+01					41	6
205	851	PC		+0000000+00	+1000000+01					41	6
206	851	PC		+0000000+00	+1000000+01					41	6
207	851	PC		+0000000+00	+1000000+01					41	6
208	851	PC		+0000000+00	+1000000+01					41	6
209	851	PC		+0000000+00	+1000000+01					41	6
210	851	PC		+0000000+00	+1000000+01					41	6
211	851	PC		+0000000+00	+1000000+01					41	6
212	851	PC		+0000000+00	+1000000+01					41	6
213	851	PC		+0000000+00	+1000000+01					41	6
214	851	PC		+0000000+00	+1000000+01					41	6
215	851	PC		+0000000+00	+1000000+01					41	6
216	851	PC		+0000000+00	+1000000+01					41	6
217	851	PC		+0000000+00	+1000000+01					41	6
218	851	PC		+0000000+00	+1000000+01					41	6
219	851	PC		+0000000+00	+1000000+01					41	6
220	851	PC		+0000000+00	+1000000+01					41	6
221	851	PC		+0000000+00	+1000000+01					41	6
222	851	PC		+0000000+00	+1000000+01					41	6
223	851	PC		+0000000+00	+1000000+01					41	6
224	851	PC		+0000000+00	+1000000+01					41	6
225	851	PC		+0000000+00	+1000000+01					41	6
226	851	PC		+0000000+00	+1000000+01					41	6
227	851	PC		+0000000+00	+1000000+01					41	6
228	851	PC		+0000000+00	+1000000+01					41	6
229	851	PC		+0000000+00	+1000000+01					41	6
230	851	PC		+0000000+00	+1000000+01					41	6
231	851	PC		+0000000+00	+1000000+01					41	6
232	851	PC		+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 19 of 20)

ENTRY	NUMBER	CONTROL BLOCK	NUMBER OF ACTIVE LPIB	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						//// EXPONENT	TABLE ID
				A0	A1	A2	A3	A4	A5		
233	851	PC		+0000000+00	+1000000+01						41 6
234	851	PC		+0000000+00	+1000000+01						41 6
235	851	PC		+0000000+00	+1000000+01						41 6
236	851	PC		+0000000+00	+1000000+01						41 6
237	851	PC		+0000000+00	+1000000+01						41 6
238	851	PC		+0000000+00	+1000000+01						41 6
239	851	PC		+0000000+00	+1000000+01						41 6
240	851	PC		+0000000+00	+1000000+01						41 6
241	851	PC		+0000000+00	+1000000+01						41 6
242	851	PC		+0000000+00	+1000000+01						41 6
243	851	PC		+0000000+00	+1000000+01						41 6
244	851	PC		+0000000+00	+1000000+01						41 6
245	851	PC		+0000000+00	+1000000+01						41 6
246	851	PC		+0000000+00	+1000000+01						41 6
247	851	PC		+0000000+00	+1000000+01						41 6
248	851	PC		+0000000+00	+1000000+01						41 6
249	851	PC		+0000000+00	+1000000+01						41 6
250	851	PC		+0000000+00	+1000000+01						41 6
251	851	PC		+0000000+00	+1000000+01						41 6
252	851	PC		+0000000+00	+1000000+01						41 6
253	851	PC		+0000000+00	+1000000+01						41 6
254	851	PC		+0000000+00	+1000000+01						41 6
255	851	PC		+0000000+00	+1000000+01						41 6
256	851	PC		+0000000+00	+1000000+01						41 6
257	851	PC		+0000000+00	+1000000+01						41 6
258	851	PC		+0000000+00	+1000000+01						41 6
259	851	PC		+0000000+00	+1000000+01						41 6
260	851	PC		+0000000+00	+1000000+01						41 6
261	851	PC		+0000000+00	+1000000+01						41 6
262	851	PC		+0000000+00	+1000000+01						41 6
263	851	PC		+0000000+00	+5000000-01						41 6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 20 of 20)

ENTRY	NUMBER	COR	NOUN	CTAYLPIEBRATION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						///// EXPID	TABLE
					A0	A1	A2	A3	A4	A5		
265	851			PC	+0000000+00	+1000000+01					41	6
		03	05	07	18	29	40	51	62	73	79	80

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 1 of 14)

ENTRY	CONTROL NUMBER	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////
							0=	1=	E X P I D / T A B L E
		UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE				
001	850 EM				0	CDAS FAILURE-BITE #1 (Tbl 1)	OK	FAIL	41 7
002	850 EM				0	CDAS FAILURE-BITE #2 (Tbl 1)	OK	FAIL	41 7
003	850 EM				0	PDS PWR OFF (Tbl 1)	ON	OFF	41 7
004	850 EM				1	PDS PWR OFF (Tbl 1)	OFF	ON	41 7
005	850 EM				0	SCS PWR OFF (Tbl 1)	ON	OFF	41 7
006	850						YES	NO	41 7
006	850 EM				1	SCS PWR OFF (Tbl 1)	OFF	ON	41 7
007	850						NO	YES	41 7
007	850 EM				0	CDAS PWR OFF (Tbl 1)	ON	OFF	41 7
008	850 EM				1	EXTRM TRAVEL LIMIT EXCEEDED	YES	NO	41 7
008	850 EM				1	CDAS PWR OFF (Tbl 1)	OFF	ON	41 7
009	850 EM				0	EXTRM TRAVEL LIMIT EXCEEDED	NO	YES	41 7
010	850						YES	NO	41 7
011	850						NO	YES	41 7
011	850 EM				1	NO AVIONICS AIR-SCS #2 (Tbl	FAIL	OK	41 7
012	850 EM						YES	NO	41 7
012	850 EM				1	NO AVIONICS AIR-PDS #2 (Tbl	FAIL	OK	41 7
013	850						NO	YES	41 7
014	850 EM				1	WATER OUTLET BYPASS	BYPS	NORM	41 7
015	850 EM				0	WATER OUTLET BYPASS	NORM	BYPS	41 7
016	850 EM				1	WATER INLET BYPASS	BYPS	NORM	41 7
017	850 EM				0	WATER INLET BYPASS	NORM	BYPS	41 7
018	850						CLS	OPN	41 7
019	850						OPN	CLS	41 7
020	850						CLS	OPN	41 7
021	850						OPN	CLS	41 7
022	850						YES	NO	41 7
023	850						NO	YES	41 7
024	850						YES	NO	41 7
025	850						NO	YES	41 7
026	850						YES	NO	41 7
027	850						NO	YES	41 7
028	850						NO	YES	41 7

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 2 of 14)

ENTRY NUMBER	CONTROL NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION ACTION CODE	TEST ABORT CODE
029	850							NO	YES	41	7
030	850							YES	NO	41	7
031	850							NO	YES	41	7
032	850							YES	NO	41	7
033	850							NO	YES	41	7
034	850							YES	NO	41	7
035	850							NO	YES	41	7
036	850							YES	NO	41	7
037	850							NO	YES	41	7
038	850							OK	FAIL	41	7
039	850							OK	FAIL	41	7
040	850							OK	FAIL	41	7
041	850							OK	FAIL	41	7
042	850							OK	FAIL	41	7
043	850							OK	FAIL	41	7
044	850							OK	FAIL	41	7
045	850							OK	FAIL	41	7
046	850	EM				1	NO AVIONICS AIR - PDS #1	FAIL	OK	41	7
047	850	EM				1	NO AVIONICS AIR - PCS #1	FAIL	OK	41	7
048	850							ON	OFF	41	7
049	850							OFF	ON	41	7
050	850							ON	OFF	41	7
051	850							OFF	ON	41	7
052	850	EM				1	LO IFEA WATER FLOW #1	FAIL	OK	41	7
053	850	EM				1	NO AVIONICS AIR - SCS #1	FAIL	OK	41	7
054	850							OK	FAIL	41	7
055	850							OK	FAIL	41	7
056	850							OK	FAIL	41	7
057	850							OK	FAIL	41	7
058	850							OK	FAIL	41	7
059	850							OK	FAIL	41	7
060	850							OK	FAIL	41	7
061	850							OK	FAIL	41	7

03	05	12	20	28	36	38	66	72	79	81	83

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 3 of 14)

ENTRY NUMBER	CONTROL OUTPUT NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION BUFFER	//////
062	850							ON	OFF	41	7
063	850							OFF	ON	41	7
064	850							ON	OFF	41	7
065	850							OFF	ON	41	7
066	850							ON	OFF	41	7
067	850							OFF	ON	41	7
068	850							ON	OFF	41	7
069	850							OFF	ON	41	7
070	850							ON	OFF	41	7
071	850							OFF	ON	41	7
072	850							ON	OFF	41	7
073	850							OFF	ON	41	7
074	850							ON	OFF	41	7
075	850							OFF	ON	41	7
076	850							ON	OFF	41	7
077	850							OFF	ON	41	7
078	850							YES	NO	41	7
079	850							NO	YES	41	7
080	850							YES	NO	41	7
081	850							NO	YES	41	7
082	850							YES	NO	41	7
083	850							NO	YES	41	7
084	850							CLS	OPN	41	7
085	850							OPN	CLS	41	7
086	850							ON	OFF	41	7
087	850							OFF	ON	41	7
088	850							ON	OFF	41	7
089	850							OFF	ON	41	7
090	850							ON	OFF	41	7
091	850							OFF	ON	41	7
092	850							ON	OFF	41	7
093	850							OFF	ON	41	7
094	850							ON	OFF	41	7
03	05	12	20	28	36	38	66	72	79	81	83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 4 of 14)

ENTRY	CONTROL	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		////
	NOR MBR	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EX PI D / AB IL E / T E
095	850						OFF	ON	41 7
096	850 EM				1	LO IFEA WATER FLOW #2	FAIL	OK	41 7
097	850 EM				1	NO AVIONICS AIR - PCS #2	FAIL	OK	41 7
098	850						OK	FAIL	41 7
099	850						OK	FAIL	41 7
100	850						OK	FAIL	41 7
101	850						OK	FAIL	41 7
102	850						OK	FAIL	41 7
103	850						OK	FAIL	41 7
104	850						OK	FAIL	41 7
105	850						OK	FAIL	41 7
106	850 EM				0	PCS UTILITY PWR OFF	ON	OFF	41 7
107	850 EM				1	PCS UTILITY PWR OFF	OFF	ON	41 7
108	850						ON	OFF	41 7
109	850						OFF	ON	41 7
110	850						ON	OFF	41 7
111	850						OFF	ON	41 7
112	850						ON	OFF	41 7
113	850						OFF	ON	41 7
114	850						ON	OFF	41 7
115	850						OFF	ON	41 7
116	850						ON	OFF	41 7
117	850						OFF	ON	41 7
118	850						ON	OFF	41 7
119	850						OFF	ON	41 7
120	850						OFF	ON	41 7
121	850						ON	OFF	41 7
122	850						ON	OFF	41 7
123	850						OFF	ON	41 7
124	850						ON	OFF	41 7
125	850						OFF	ON	41 7
126	850						ON	OFF	41 7
127	850						OFF	ON	41 7

03	05	12	20	28	36 38	66	72	79	81	83

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 5 of 14)

ENTRY	CONTROL NUMBER	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		EXCEPTION ACTION	
	OPERATOR	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXP PB	TAB
128	850						ON	OFF	41	7
129	850						OFF	ON	41	7
130	850						ON	OFF	41	7
131	850						OFF	ON	41	7
132	850						ON	OFF	41	7
133	850						OFF	ON	41	7
134	850						ON	OFF	41	7
135	850						OFF	ON	41	7
136	850						ON	OFF	41	7
137	850						OFF	ON	41	7
186	850						NO	YES	41	7
200	850 EM				1		WAIT	RUN	41	7
212	850 LS	3740		3740		HI EXP MAIN BUS CURRENT			41	7
213	850 LS	3358	2396			EXP MAIN BUS VOLTAGE OOL			41	7
214	850 LS	410		819		HI IFEA LOWER HUMIDITY			41	7
215	850 LS	410		819		HI IFEA UPPER HUMIDITY			41	7
216	850 LS	1911	887	1979	887	IFEA PRESSURE 1 OOL			41	7
217	850 LS	1911	887	1979	887	IFEA PRESSURE 2 OOL			41	7
218	850 LS	1954		2035		HI LOWER ATMOS TEMP			41	7
219	850 LS	1954		2035		HI UPPER ATMOS TEMP			41	7
220	850 LS	504		585		HI IFEA WATER INLET TEMP			41	7
221	850 LS	827		907		HI IFEA WATER OUTLET TEMP			41	7
222	850 LS	827		907		HI CLD END SHELL TEMP			41	7
223	850 LS	827		907		HI HOT END SHELL TEMP			41	7
224	850 LS	827		907		HI RFM WATER OUTLET TEMP			41	7
261	850 LS	2007		2007		HI STEP MTR PHASE A CURRENT			41	7
262	850 LS	2163		2163		HI STEP MTR PHASE A VOLTAGE			41	7
263	850 LS	2007		2007		HI STEP MTR PHASE B CURRENT			41	7
264	850 LS	2163		2163		HI STEP MTR PHASE B VOLTAGE			41	7
266	850 LS	827		1067		HI FTS STEPPER MOTOR TEMP			41	7
268	850 LS	3003		3003		HI COLD GUARD HTR CURRENT			41	7
269	850 LS	1536		1536		HI COLD GUARD HTR VOLTAGE			41	7
270	850 LS	3003		3003		HI COLD PRIM HTR CURRENT			41	7

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 6 of 14)

ENTRY NUMBER	CONTROL BLOCK	CONTROL OPTIONS	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
			UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXCEPTION PRIORITY	TASK BLOCK
271	850	LS	1536		1536		HI COLD PRIM HTR VOLTAGE			41	7
272	850	LS	3003		3003		HI COLD RED HTR CURRENT			41	7
273	850	LS	1536		1536		HI COLD RED HTR VOLTAGE			41	7
274	850	LS	3003		3003		HI BOOST HTR CURRENT			41	7
275	850	LS	3072		3072		HI BOOST HTR VOLTAGE			41	7
276	850	LS	3003		3003		HI HOT GUARD HTR CURRENT			41	7
277	850	LS	1536		1536		HI HOT GUARD HTR VOLTAGE			41	7
278	850	LS	3003		3003		HI HOT PRIM HTR CURRENT			41	7
279	850	LS	3072		3072		HI HOT PRIM HTR VOLTAGE			41	7
280	850	LS	3003		3003		HI HOT RED HTR CURRENT			41	7
281	850	LS	3072		3072		HI HOT RED HTR VOLTAGE			41	7
282	850	LS	827		907		HI CJ TEMP - COLD ZONE #1			41	7
283	850	LS	827		907		HI CJ TEMP - COLD ZONE #2			41	7
284	850	LS	827		907		HI CJ TEMP - HOT ZONE #1			41	7
285	850	LS	827		907		HI CJ TEMP - HOT ZONE #2			41	7
286	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 1			41	7
287	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 2			41	7
288	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 1			41	7
289	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 2			41	7
290	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 1			41	7
291	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 2			41	7
292	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 1			41	7
293	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 2			41	7
294	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 1			41	7
295	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 2			41	7
296	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 1			41	7
297	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 2			41	7
313	850	LS	987		1227		HI ALIGN ARM TEMP			41	7
314	850	LS	827		907		HI SEM TRACK TEMP			41	7
465	850							NO	YES	41	7
466	850							NO	YES	41	7
467	850							NO	YES	41	7
468	850							NO	YES	41	7

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 7 of 14)

ENTRY NUMBER	CONTROL NUMBER	OPERATIONAL MODE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION PROCESSING DISPLAY	TAPE BLOCK
469	850							NO	YES	41	7
489	850							OK	FAIL	41	7
490	850							OK	FAIL	41	7
491	850							OK	FAIL	41	7
492	850							OK	FAIL	41	7
493	850							OK	FAIL	41	7
494	850							OK	FAIL	41	7
495	850							OK	FAIL	41	7
496	850							OK	FAIL	41	7
497	850							OK	FAIL	41	7
498	850							OK	FAIL	41	7
499	850							OK	FAIL	41	7
500	850							OK	FAIL	41	7
501	850							OK	FAIL	41	7
502	850							OK	FAIL	41	7
503	850							OK	FAIL	41	7
504	850							OK	FAIL	41	7
505	850							OK	FAIL	41	7
506	850							OK	FAIL	41	7
507	850							OK	FAIL	41	7
508	850							OK	FAIL	41	7
509	850							OK	FAIL	41	7
510	850							OK	FAIL	41	7
511	850							OK	FAIL	41	7
512	850							OK	FAIL	41	7
513	850							OK	FAIL	41	7
514	850							OK	FAIL	41	7
515	850							OK	FAIL	41	7
516	850							OK	FAIL	41	7
517	850							OK	FAIL	41	7
518	850							OK	FAIL	41	7
519	850							OK	FAIL	41	7
520	850							OK	FAIL	41	7

0	0	1	2	2	3	3	6	7	7	8	8
3	5	2	0	8	6	8	6	2	9	1	3

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 8 of 14)

ENTRY NUMBER	COMMAND OUTPUT REGISTER	MONITOR BYPASS	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION MONITOR MESSAGE	TABLE ADDRESS
521	850							OK	FAIL		41 7
522	850							OK	FAIL		41 7
523	850							OK	FAIL		41 7
524	850							OK	FAIL		41 7
525	850							OK	FAIL		41 7
526	850							OK	FAIL		41 7
527	850							OK	FAIL		41 7
528	850							OK	FAIL		41 7
529	850							OK	FAIL		41 7
530	850							OK	FAIL		41 7
531	850							OK	FAIL		41 7
532	850							OK	FAIL		41 7
533	850							OK	FAIL		41 7
534	850							OK	FAIL		41 7
535	850							OK	FAIL		41 7
536	850							OK	FAIL		41 7
537	850							OK	FAIL		41 7
538	850							OK	FAIL		41 7
539	850							OK	FAIL		41 7
540	850							OK	FAIL		41 7
541	850							OK	FAIL		41 7
542	850							OK	FAIL		41 7
543	850							OK	FAIL		41 7
544	850							OK	FAIL		41 7
545	850							OK	FAIL		41 7
546	850							OK	FAIL		41 7
547	850							OK	FAIL		41 7
548	850							OK	FAIL		41 7
549	850							OK	FAIL		41 7
550	850							OK	FAIL		41 7
551	850							OK	FAIL		41 7
552	850							OK	FAIL		41 7
553	850							OK	FAIL		41 7

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 9 of 14)

ENTRY	CONTROL OPERATOR	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		////
NUMBER	NUMBER	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	////
554	850						OK	FAIL	41 7
555	850						OK	FAIL	41 7
556	850						OK	FAIL	41 7
557	850						OK	FAIL	41 7
558	850						OK	FAIL	41 7
559	850						OK	FAIL	41 7
560	850						OK	FAIL	41 7
561	850						OK	FAIL	41 7
562	850						OK	FAIL	41 7
563	850						OK	FAIL	41 7
564	850						OK	FAIL	41 7
565	850						OK	FAIL	41 7
566	850						OK	FAIL	41 7
567	850						OK	FAIL	41 7
568	850						OK	FAIL	41 7
569	850						OK	FAIL	41 7
570	850						OK	FAIL	41 7
571	850						OK	FAIL	41 7
572	850						OK	FAIL	41 7
573	850						OK	FAIL	41 7
574	850						OK	FAIL	41 7
575	850						OK	FAIL	41 7
576	850						OK	FAIL	41 7
577	850						OK	FAIL	41 7
578	850						OK	FAIL	41 7
579	850						OK	FAIL	41 7
580	850						OK	FAIL	41 7
581	850						OK	FAIL	41 7
582	850						OK	FAIL	41 7
583	850						OK	FAIL	41 7
584	850						OK	FAIL	41 7
585	850						OK	FAIL	41 7
586	850						OK	FAIL	41 7

0	0	1	2	2	3	3	6	7	7	8	8	E	T	
3	5	2	0	8	6	8	6	2	9	1	3	P	A	
												I	B	
												D	L	
													E	

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 10 of 14)

ENTRY	CONNECTOR NUMBER	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION INDICATOR	TEST ABLE
587	850						OK	FAIL	41	7
588	850						OK	FAIL	41	7
589	850						OK	FAIL	41	7
590	850						OK	FAIL	41	7
591	850						OK	FAIL	41	7
592	850						OK	FAIL	41	7
593	850						OK	FAIL	41	7
594	850						OK	FAIL	41	7
595	850						OK	FAIL	41	7
596	850						OK	FAIL	41	7
597	850						OK	FAIL	41	7
598	850						OK	FAIL	41	7
599	850						OK	FAIL	41	7
600	850						OK	FAIL	41	7
601	850						OK	FAIL	41	7
602	850						OK	FAIL	41	7
603	850						OK	FAIL	41	7
604	850						OK	FAIL	41	7
605	850						OK	FAIL	41	7
606	850						OK	FAIL	41	7
607	850						OK	FAIL	41	7
608	850						OK	FAIL	41	7
609	850						OK	FAIL	41	7
610	850						OK	FAIL	41	7
611	850						OK	FAIL	41	7
612	850						OK	FAIL	41	7
613	850						OK	FAIL	41	7
614	850						OK	FAIL	41	7
615	850						OK	FAIL	41	7
616	850						OK	FAIL	41	7
617	850						OK	FAIL	41	7
618	850						OK	FAIL	41	7
619	850						OK	FAIL	41	7

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 11 of 14)

ENTRY	CONTROL MODE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION DISPLAY ENABLE	EXCEPTION DISPLAY TABLE
620	850						OK	FAIL	41	7
621	850						OK	FAIL	41	7
622	850						OK	FAIL	41	7
623	850						OK	FAIL	41	7
624	850						OK	FAIL	41	7
625	850						OK	FAIL	41	7
626	850						OK	FAIL	41	7
627	850						OK	FAIL	41	7
628	850						OK	FAIL	41	7
629	850						OK	FAIL	41	7
630	850						OK	FAIL	41	7
631	850						OK	FAIL	41	7
632	850						OK	FAIL	41	7
633	850						OK	FAIL	41	7
634	850						OK	FAIL	41	7
635	850						OK	FAIL	41	7
636	850						OK	FAIL	41	7
637	850						OK	FAIL	41	7
638	850						OK	FAIL	41	7
639	850						OK	FAIL	41	7
640	850						OK	FAIL	41	7
641	850						OK	FAIL	41	7
642	850						OK	FAIL	41	7
643	850						OK	FAIL	41	7
644	850						OK	FAIL	41	7
645	850						OK	FAIL	41	7
646	850						OK	FAIL	41	7
647	850						OK	FAIL	41	7
648	850						OK	FAIL	41	7
649	850						OK	FAIL	41	7
650	850						OK	FAIL	41	7
651	850						OK	FAIL	41	7
652	850						OK	FAIL	41	7

0 3	0 5	1 2	2 0	2 8	3 6	3 8	6 6	7 2	7 9	8 1	8 3

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 12 of 14)

ENTRY NUMBER	COMMAND OUTPUT REGISTER	COMMAND NUMBER BIT	MONITOR TYPE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		EXCEPTION MONITOR MESSAGE NUMBER	
				UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXCEPTION MONITOR MESSAGE	
653	850								OK	FAIL	41	7
654	850								OK	FAIL	41	7
655	850								OK	FAIL	41	7
656	850								OK	FAIL	41	7
657	850								OK	FAIL	41	7
658	850								OK	FAIL	41	7
659	850								OK	FAIL	41	7
660	850								OK	FAIL	41	7
661	850								OK	FAIL	41	7
662	850								OK	FAIL	41	7
663	850								OK	FAIL	41	7
664	850								OK	FAIL	41	7
665	850								OK	FAIL	41	7
666	850								OK	FAIL	41	7
667	850								OK	FAIL	41	7
668	850								OK	FAIL	41	7
669	850								OK	FAIL	41	7
670	850								OK	FAIL	41	7
671	850								OK	FAIL	41	7
672	850								OK	FAIL	41	7
673	850								OK	FAIL	41	7
674	850								OK	FAIL	41	7
675	850								OK	FAIL	41	7
676	850								OK	FAIL	41	7
677	850								OK	FAIL	41	7
678	850								OK	FAIL	41	7
679	850								OK	FAIL	41	7
680	850								OK	FAIL	41	7
681	850								OK	FAIL	41	7
682	850								OK	FAIL	41	7
683	850								OK	FAIL	41	7
684	850								OK	FAIL	41	7
685	850								OK	FAIL	41	7
03	05		12	20	28	36	38	66	72	79	81	83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 13 of 14)

ENTRY NUMBER	CONTROL OPERATOR MOMENTARY BYPASS	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION X	EXCEPTION PROCESSING	EXCEPTION LATCH
686	850						OK	FAIL	41	7	
687	850						OK	FAIL	41	7	
688	850						OK	FAIL	41	7	
689	850						OK	FAIL	41	7	
690	850						OK	FAIL	41	7	
691	850						OK	FAIL	41	7	
692	850						OK	FAIL	41	7	
693	850						OK	FAIL	41	7	
694	850						OK	FAIL	41	7	
695	850						OK	FAIL	41	7	
696	850						OK	FAIL	41	7	
697	850						OK	FAIL	41	7	
698	850						OK	FAIL	41	7	
699	850						OK	FAIL	41	7	
700	850						OK	FAIL	41	7	
701	850						OK	FAIL	41	7	
702	850						OK	FAIL	41	7	
703	850						OK	FAIL	41	7	
704	850						OK	FAIL	41	7	
705	850						OK	FAIL	41	7	
706	850						OK	FAIL	41	7	
707	850						OK	FAIL	41	7	
708	850						OK	FAIL	41	7	
709	850						OK	FAIL	41	7	
710	850						OK	FAIL	41	7	
711	850						OK	FAIL	41	7	
712	850						OK	FAIL	41	7	
713	850						OK	FAIL	41	7	
714	850						OK	FAIL	41	7	
715	850						OK	FAIL	41	7	
716	850						OK	FAIL	41	7	
717	850						OK	FAIL	41	7	
718	850						OK	FAIL	41	7	
	03 05	12	20	28	36 38		66	72	79	81	83

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 14 of 14)

ENTRY NUMBER	CONTROLLER NUMBER	CONTROLLER OUTPUT NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////
				UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	//// E X P I D -- T A B L E
719	850								OK	FAIL	41 7
720	850								OK	FAIL	41 7
721	850								OK	FAIL	41 7
722	850								OK	FAIL	41 7
723	850								OK	FAIL	41 7
724	850								OK	FAIL	41 7
725	850								OK	FAIL	41 7
726	850								OK	FAIL	41 7
727	850								OK	FAIL	41 7
728	850								OK	FAIL	41 7
729	850								OK	FAIL	41 7
730	850								OK	FAIL	41 7
731	850								OK	FAIL	41 7
732	850								OK	FAIL	41 7
733	850								OK	FAIL	41 7
734	850								OK	FAIL	41 7
735	850								OK	FAIL	41 7
736	850								OK	FAIL	41 7
737	850								OK	FAIL	41 7
738	850								OK	FAIL	41 7
739	850								OK	FAIL	41 7
740	850								OK	FAIL	41 7
741	850								OK	FAIL	41 7
742	850								OK	FAIL	41 7
743	850								OK	FAIL	41 7
744	850								OK	FAIL	41 7
745	850								OK	FAIL	41 7
746	850								OK	FAIL	41 7
747	850								OK	FAIL	41 7
748	850								OK	FAIL	41 7
749	850								OK	FAIL	41 7
750	850								OK	FAIL	41 7
264	851								OK	FAIL	41 7
266	851								RUN	WAIT	42 7
									NO	YES	42 7
03	05			12	20	28	36 38		66	72	79 81 83

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1.8. FLIGHT SOFTWARE REQUIREMENTS

This section of the Experiment/Facility Requirements Document (E/FRD) defines the Space Station Freedom (SSF) Data Management System (DMS) software functions required to support the Space Station Furnace Facility (SSFF).

The SSFF Core Control Unit (CCU) software will interface to the SSF Payload Executive Software (PES) for DMS services and executive-level control. The SSFF Furnace Control Unit (FCU) and Furnace Actuator Unit (FAU) software provides networking, data processing, storage, and data acquisition and control for Furnace Module-1. The SSFF software external interface diagram is shown in Figure 1.8-1. The SSFF software component tree is shown in Figure 1.8-2. These components will reside in the DMS hardware. The following subsections define the required resources and data handling requirements.

1.8.1 COMMAND SUPPORT

The SSF via the PES software will support the issuance of commands and SSFF activation given by the ground, onboard crew, or Tier 1.

1.8.2 HEALTH AND STATUS DATA

The PES will acquire health and status data from the SSFF and distribute it to Tier 1 on board and to the Payload Operations Integration Center (POIC) on the ground.

1.8.3 ONBOARD STORAGE

The SSF will provide storage for SSFF and/or Furnace Module-1 program loads, operations, status, and science data.

1.8.4 DISPLAY

The SSF multipurpose application console (MPAC) will provide backup support of the SSFF crew interface for onboard SSFF configuration and preparations for Furnace Module-1 experiment operations.

1.8.5 PROGRAM LOADS AND MODIFICATIONS DOWNLOADING

The SSF software shall support the downloading of SSFF program loads and modifications.

1.8.6 ANCILLARY DATA

The SSF shall support requests for ancillary data.

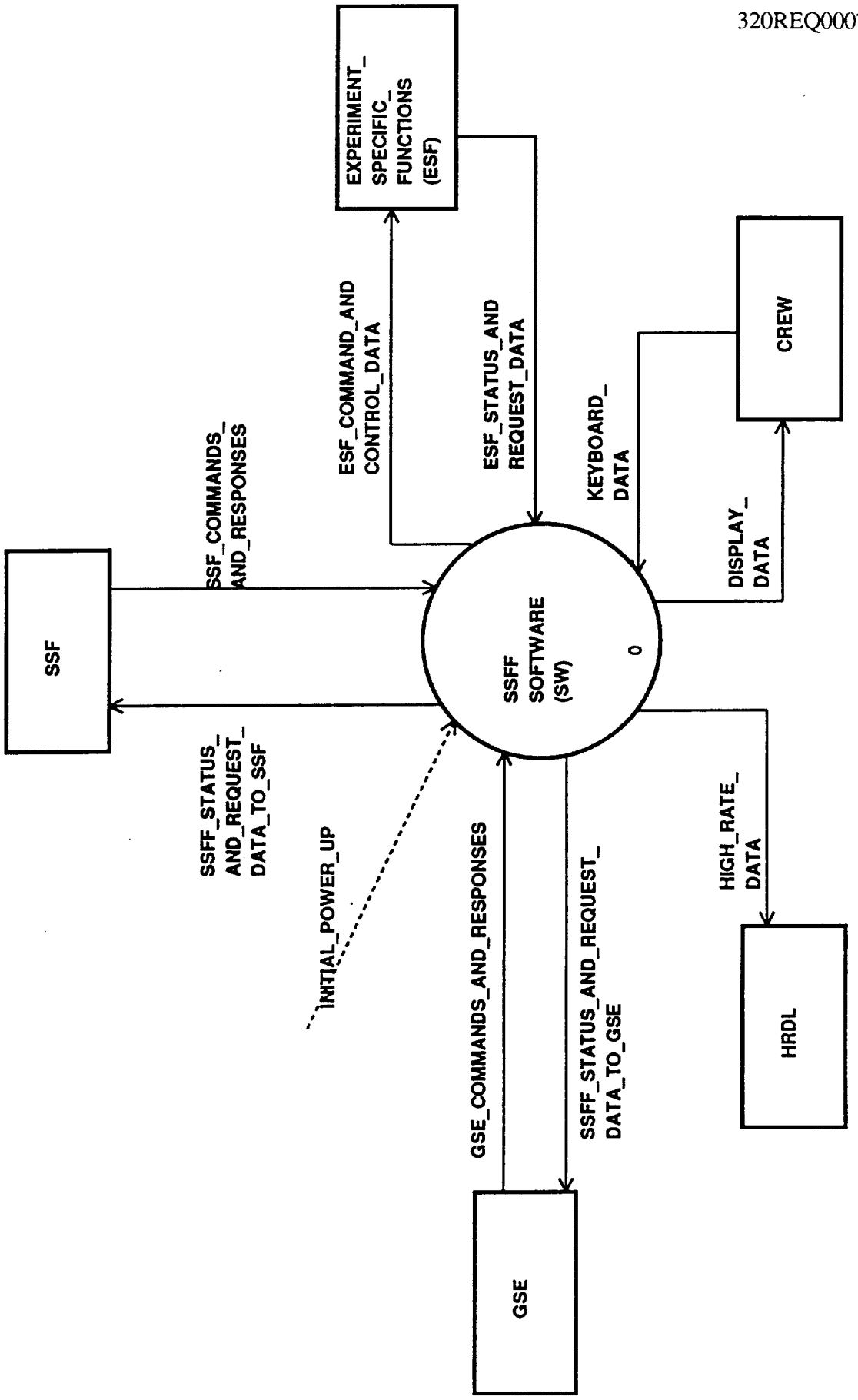


FIGURE 1.8-1. SSFF SOFTWARE EXTERNAL INTERFACE DIAGRAM

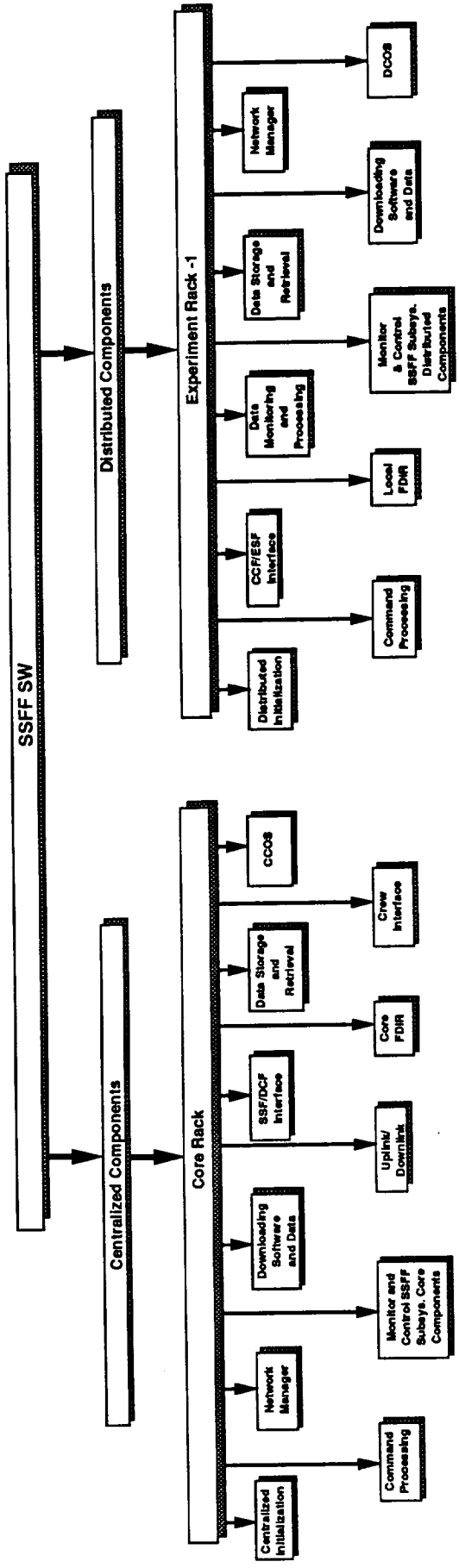


FIGURE 1.8-2. SOFTWARE COMPONENT TREE

1.9. PHYSICAL INTEGRATION

1.9.1 RACK INTEGRATION AND CHECKOUT

Physical integration during prelaunch consists of checkout and integration of Furnace Module-1, the individual Core Rack and Experiment Rack-1, and finally the SSFF as an integrated system. Interfaces are progressively verified as the buildup of the Space Station Furnace Facility (SSFF) is performed. Following shipment to Kennedy Space Center (KSC), the facility is visually checked for physical integrity, and a limited functional test is performed to ensure operability and Space Station Freedom (SSF) interface compatibility. The prelaunch activities flow is shown in Figure 1.9-1. Table 1.9-1 provides the integration facility requirements for each stage of integration. Table 1.9-2 describes the requirements and activities at each step of the integration process.

1.9.1.1 Core Rack Checkout

Tests, using the appropriate ground support equipment (GSE) including SSF and experiment rack interface simulators, will be performed to verify proper operations of the Core Rack. Testing will include operation of each SSFF subsystem and component to its operational limits, and an integrated SSFF exercising each of the interface functions, through the use of simulators, with the SSF and the experiment rack.

1.9.1.2 Experiment Rack-1 Checkout

The pre-experiment rack checkout will consist of verifying the performance of the SSFF distributed subsystems in Experiment Rack-1 and its interfaces to the Core Rack and Furnace Module-1.

1.9.1.3 Furnace Module-1 Checkout

Furnace Module-1 tests will be used to verify the performance to operational limits with the exception that heater limits will only be to the extent that they prove operability. The Furnace Module-1 interface to Experiment Rack-1 will be verified through the functional performance tests and the physical connects of the experiment rack simulator.

1.9.1.4 Integrated Furnace Rack Checkout

Following integration of Furnace Module-1 into Experiment Rack-1, the rack performance and interfaces will be verified using a Core Rack simulator and test set. Tests will be limited to only those required to verify Furnace Module-1 to Experiment Rack-1 interfaces.

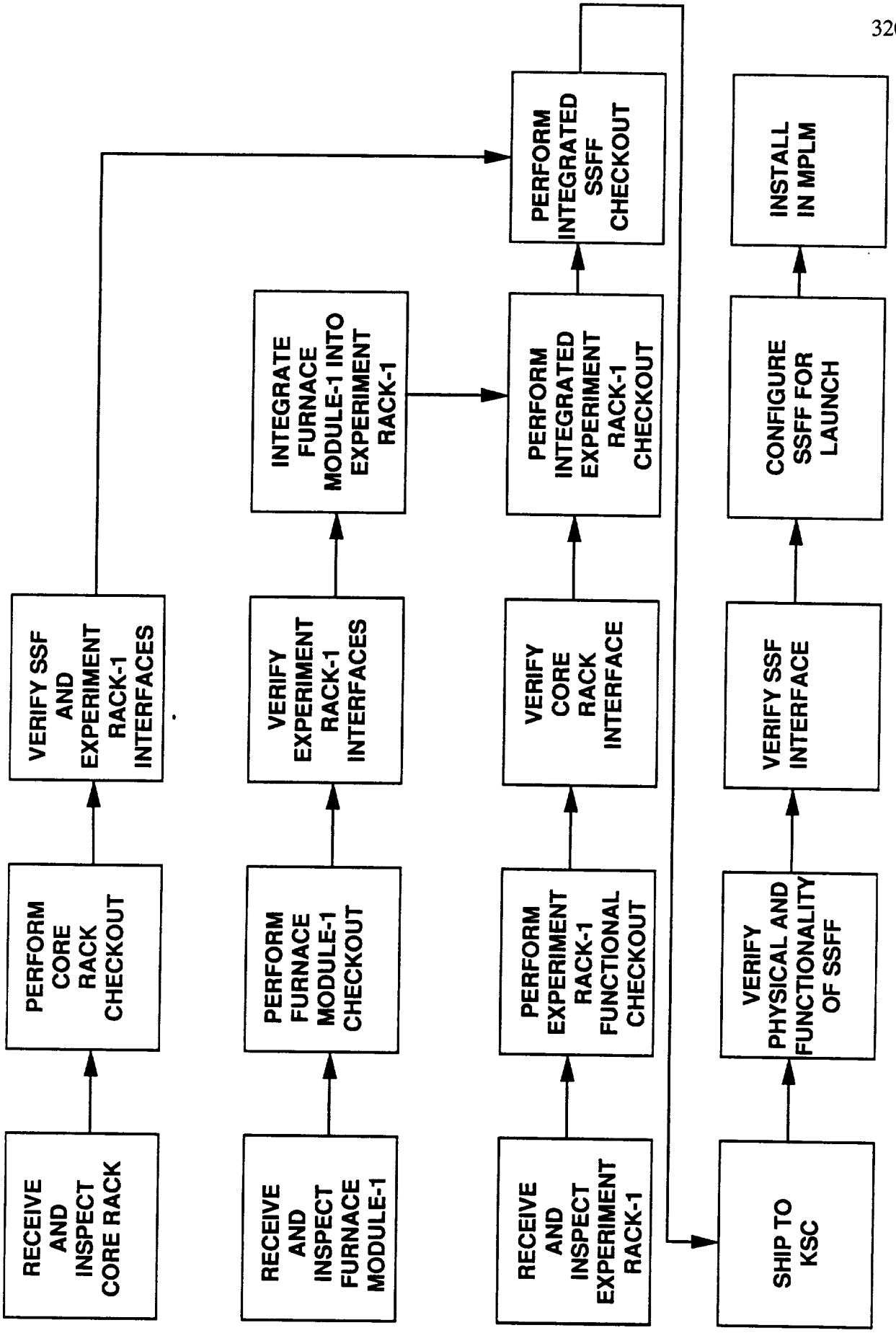


FIGURE 1.9-1. PHYSICAL INTEGRATION FLOW

TABLE 1.9-1. SSFF INTEGRATION GROUND PROCESSING REQUIREMENTS

(X) Experiment/Facility Preintegration
( ) Experiment/Facility Preparation
( ) Postmission Requirements

Description of Planned Activities:
Rack Integration, Rack Functional Tests, SSFF Systems Integrated Tests

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: X Yes ____ No Hook Height 8 ft

Facility Power Required: X 120 V, 1 F, 60 Hz
____ 208 V, 3 F, 60 Hz
____ Other

Other Facility Support: Gases X GN_2 Liquids Single Phase Precooled H_2O
____ GHe
GAr Other

Environment: X Standard ___ Other

Hazardous Operations: ____Yes X No

Total Anticipated Use Time: 45 Days

Other Facility Support Description:

GSE Test sets including the following interface simulators:

* Furnace Module-to-Experiment
* Core Rack-to-Experiment Rack
* Experiment Rack-to-Core Rack
* SSF-to-Core Rack
* Experiment Rack Subsystem-to-Furnace Module

TABLE 1.9-2. SSFF INTEGRATION REQUIREMENTS

Description of Special Alignment, Calibration, Servicing, or Performance Verification and Estimated Time to Perform:

* Vent & Purge test of Furnace Module-1 - 60 min

* Calibration of Analog Sensors - 90 min

Identification of Any Constraints on Experiment/Facility Operations During Tests:

None Identified

Description of Time-Critical Operations and Time Constraints:

None Identified

1.9.1.5 SSFF Facility Checkout

Following checkout of the individual racks, an overall SSFF integrated systems test will be performed. Tests will be limited to verify Core Rack-to-Experiment Rack-1 interfaces and to SSF.

1.9.2 KSC VERIFICATION

Physical integration at KSC will be limited to receiving/inspection of the SSFF hardware complement and to reverification of the physical and functional interfaces with the SSF.

1.9.3 POSTLANDING

Postlanding activities consist of the following: (1) Removing the SSFF equipment and experiment samples from the returning Mini-Pressurized Logistics Module (MPLM); (2) returning the Furnace Module-1 samples to the Payload Investigator; (3) removing the Furnace Module-1 from Experiment Rack-1 and returning it to the PED; and (4) refurbishing Experiment Rack-1. These activities are shown in Table 1.9-3 and Figure 1.9-2.

TABLE 1.9-3. SSFF POSTLANDING GROUND PROCESSING REQUIREMENTS

( ) Experiment/Facility Preintegration
( ) Experiment/Facility Preparation
(X) Postmission Requirements

Description of Planned Activities:
Remove flight samples from stowage and return to Experimenter.
Remove flight rack from MPLM.
Remove furnace module from experiment rack and return to PED.
Move experiment rack to the rack refurb area and refurbish experiment rack.
Ship rack to the rack integration and checkout area.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: X Yes __ No Hook Height 8 ft

Facility Power Required:
_____ 120 V, 1 F, 60 Hz N/A
_____ 208 V, 3 F, 60 Hz
_____ Other

Other Facility Support: Gases N/A _____ GN_2 Liquids N/A
_____ GHe _____
_____ Other _____

Environment: X Standard _____ Other

Hazardous Operations: _____ Yes X No

Total Anticipated Use Time: 3 Days

Other Facility Support Description:

Module shipping container
Rack shipping container
Rack rotation stand

C-3

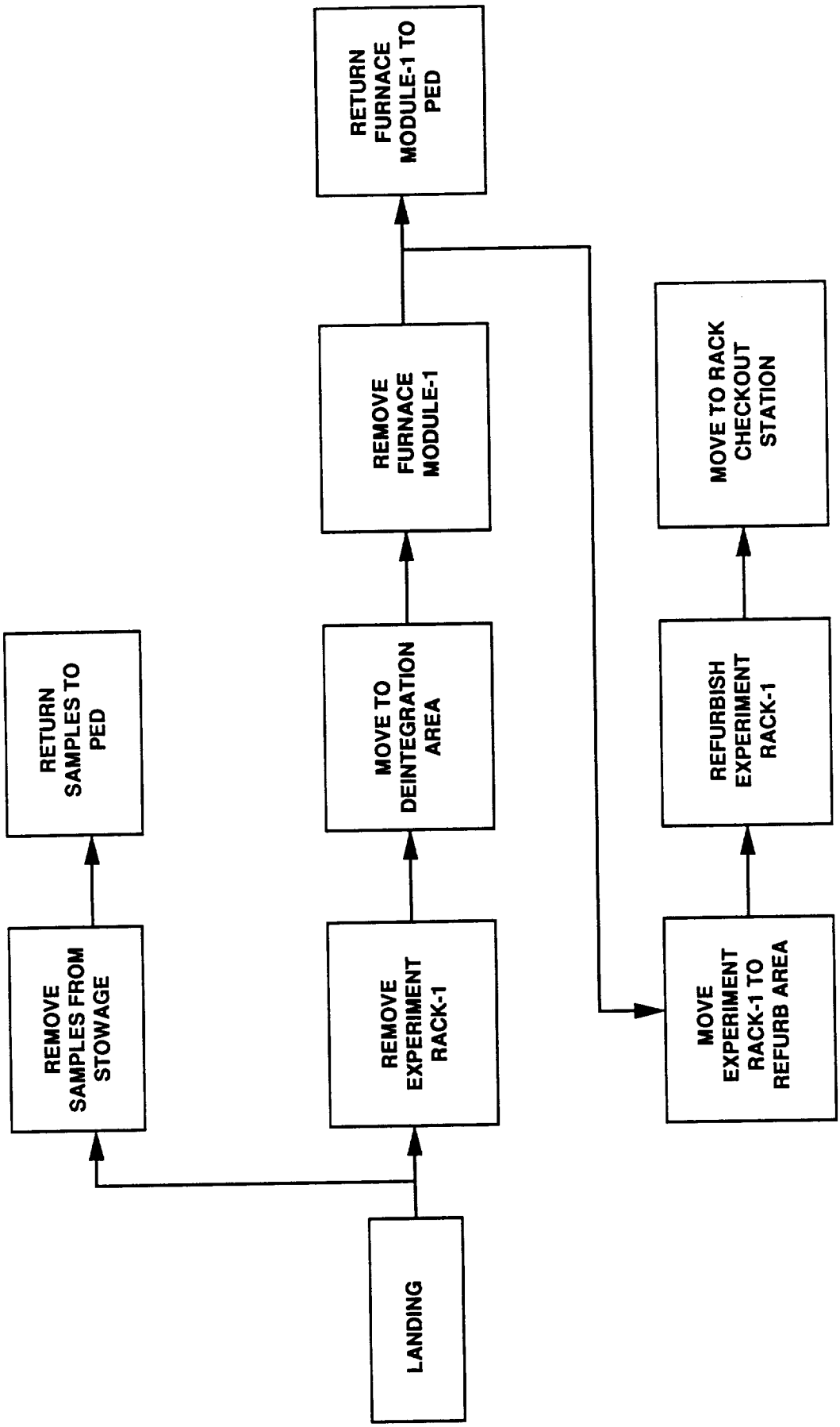


FIGURE 1.9-2. PHYSICAL DEINTEGRATION FLOW

1.10. OPERATIONS SUPPORT

Table 1.10-1 describes the physical and operational support required at the Ground Science Operations Control Center during flight of the Space Station Furnace Facility (SSFF).

TABLE 1.10-1. SSFF MISSION OPERATIONS SUPPORT

COMMUNICATIONS REQUIREMENTS:

Downlink Data

TBD

Uplink Commands/data

TBD

Voice Communications

TBD

Video

TBD

SUPPORT EQUIPMENT:

Description

TBD

Dimensions

TBD

Power Requirements

TBD

Data Interface

TBD

REMOTE SITE INTERFACE

Location

TBD

Describe interfaces

TBD

1.11. TRAINING OBJECTIVES

Table 1.11-1 correlates the training requirements with the appropriate trainees and trainers, and identifies the source of the training requirements. Table 1.11-2 summarizes the requirements for each training objective.

TABLE 1.11-1. TRAINING PARTICIPATION

Training Objectives	Trainee	Trainer
-PED/PI Defined TBD		
-PAM and PED/PI Jointly Defined TBD		
-PAM Defined TBD		

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 1 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR				COMMENTS
				Y/N	H/W FIDELITY	S/W Y/N	PROVIDER	
1.0	**SCIENCE BACKGROUND**							
1.1	Present science basis and significance of the SSFF	payload crew, cadre	PED/PI	N				
1.2	Present operational objectives	payload crew, cadre	PED/PI	N				
1.3	Present SSFF operational theory	payload crew, cadre	PED/PI	N				
1.4	Present operations philosophy	payload crew, cadre	PED/PI	N				
2.0	**SSFF SYSTEMS FAMILIARIZATION**							
2.1	Characterize the SSFF hardware elements	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.1.1	Rack location of the FM-1, rack location of the Core							
2.1.2	FM-1 and subsystem components							
2.1.3	Module stowage							
2.1.4	DMS							

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 2 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR				COMMENTS
				Y/N	H/W FIDELITY	S/W Y/N	PROVIDER	
2.2	Characterize FM-1 software associated with the following:	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.2.1	DMS							
2.2.2	FM-1 command capabilities							
2.2.3	In-flight computer requirements							
2.2.4	Timeline requirements							
2.2.5	Furnace Control Units							
2.3	Characterize FM-1 data collection	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.3.1	Onboard routing/recording							
2.3.2	Downkink data and voice							
2.4	Characterize FM-1 GSE	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.5	Characterize SSF interface	payload crew, cadre	PED/PI	Y	a		PED/PI	
2.5.1	Power, fluids, and thermal interfaces							
2.6	Characterize the following SSFF operational requirements and constraints:	payload crew, cadre	PED/PI	Y			PED/PI	
2.6.1	Specific attitudes or conditions							
2.6.2	Microgravity requirements (limiting crew motion and g-level constraints)							

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 3 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR				COMMENTS
				Y/N	H/W FIDELITY	S/W Y/N	PROVIDER	
3.0	**FM-1 OPs FAMILIARIZATION**							
3.1	Characterize FM-1 nominal operating procedures	payload crew, cadre	PED/PI				PED/PI	
3.1.1	Power on							
3.1.2	Sample changeout							
3.1.3	Power off							
3.1.4	FM-1 safing and stowage							
4.0	**FM-1 PROFICIENCY OBJECTIVES**							
4.1	Provide proficiency training in FM-1 operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
4.2	Characterize malfunction/ alternate procedures including fault definition	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.0	**INTEGRATED TIMELINE PROFICIENCY**							
5.1	Provide additional proficiency training in FM-1 ops as it relates to the joint operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.2	Provide additional training as it pertains to off-nominal procedures for joint operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.3	Provide proficiency training in integrated FM-1 ops including harware/software, SSF/Orbiter/PI interfaces	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 4 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR				COMMENTS
				Y/N	H/W FIDELITY	S/W Y/N	PROVIDER	
6.0	**SIMULATIONS**							
6.1	Conduct MSFC simulations in order to develop proficiency in the following: console operations, handover, voice protocols, crew/cadre/MCC interfaces, integrated payload operations, STS/SSF payload contingency operations	payload crew, cadre	PAM	Y			PED/PI/ PAM	
6.2	Conduct joint integrated simulations in order to demonstrate proficiency in the following: console positions, handover, voice protocols, crew/cadre/MCC interfaces, payload operations, furnace contingency operations, data retrieval systems, operational interfaces between ground control facilities, mission flight rules							
7.0	**MISSION-INDEPENDENT TRAINING**							
7.1	Provide STS/SSF mission-independent training	payload crew	PAM/JSC					
7.2	Provide mission-independent training	cadrePI/Sim Team	PAM	N				

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1.12. ENVIRONMENTAL CONTAMINATION DATA REQUIREMENTS

Tables 1.12-1 and 1.12-2 illustrate the environmental contamination data requirements for the Space Station Furnace Facility (SSFF).

TABLE 1.12-1. FLIGHT ENVIRONMENT LIMITS

	SENSITIVITY LIMIT				EXPERIMENT GENERATED			
	OPERATING		NON-OPER-ATING		OPERATING		NON-OPER-ATING	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
PARTICULATES								
Size (micrometers)						• <1 micron normal operations • 0.1 to 50 microns following filter changeout		
Number/m^3						• <1,000 normal operations • <100,000 following filter changeout		
Composition						• Ceramic fibers, copper, steel, platinum, wire insulation, organic particles, and sample-sourced materials, including molybdenum, boron nitride, nickel alloys, quartz, silica, and semiconductor materials		
GASES								
Composition						•Cabin air, or inert pressurant with cleaning solvents and/or water contaminant		
Concentration						TBD		
Pressure (kN/m^2)						• <101.3 for experiment venting • 66.7 for vent of inert pressurants		

TABLE 1.12-2. EXTERNAL CONTAMINATION SOURCES

Does experiment/facility release (vent, purge) any material overboard on orbit?

Yes _____ **No** __X__

PARAMETER	DESCRIPTION
FOs of Occurrence	
Frequency	
Duration	
Composition	
Phase State (solid, liquid, or gas)	
Quantity or Rate of Release	

DATA REQUIREMENT (DR) - 10

EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

SECTION 2: FURNACE MODULE-1 INPUT

MAY 1992

FOREWORD

The Space Station Furnace Facility (SSFF) Core is designed to accommodate and support a variety of furnace modules throughout the operational lifetime of the facility. Since the SSFF will be operational for 30 years, and various furnace modules will be accommodated, the Experiment/Facility Requirements Document (E/FRD) is divided into two separate sections. Section 1 describes the integrated SSFF-to-SSF interface, which includes the SSFF Core subsystem requirements and the furnace module requirements based on the information obtained from the Furnace Developer's Section 2, and Section 2 describes the furnace module-to-SSFF interface. Multiple Section 2s may be required for each E/FRD, depending on how many furnace modules the SSFF will accommodate per mission, since a separate Section 2 will be written for each furnace module. Both sections will be replaced for each mission with the appropriate mission-peculiar furnace module and interface requirements.

This section describes the Furnace Module-1 requirements. Furnace Module-1 is scheduled to be an upgrade of the present Crystal Growth Furnace (CGF), and this section reflects the requirements of that module.

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2.1. FUNCTIONAL OBJECTIVES AND EQUIPMENT IDENTIFICATION

2.1.1 SYSTEM DESCRIPTION

The function of Furnace Module-1 is to grow crystals of semiconductor materials and metal and alloys using the directional solidification and vapor transport crystal growth techniques in a microgravity environment (at temperatures up to 1600 °C). Directional solidification is achieved by melting the sample and solidifying the same while applying a thermal gradient along the longitudinal axis of the sample and translating the furnace or the sample. In the case of Furnace Module-1, the furnace is translated.

The Furnace Module-1 system is shown in Figure 2.1-1. It consists of the following primary elements: the Sample Ampoule/Cartridge Assembly (SACA), the base ring, and the experiment apparatus container (EAC) in which the reconfigurable furnace module (RFM), the furnace translation mechanism (FTM), the sample exchange mechanism (SEM), the sample insertion port (SIP) and the internal support structure (ISS) are housed. The ISS, in addition to providing the structural support for the RFM, the FTM, and attach hardware for the plumbing, provides an interface for the SEM which will have the capability to hold up to six sample ampoules. The bottom section of the EAC is attached to the base ring, which includes the feedthroughs for power, data, fluid, and vent lines.

The Space Station Furnace Facility (SSFF) Thermal Control Subsystem (TCS) water loop will provide cooling for the RFM outer shell, the FTS stepping motor, and the SEM ampoule holding head.

The SSFF Gas Distribution Subsystem (GDS) will supply argon and nitrogen to the EAC in order to provide an inert processing atmosphere for crystal growth.

The SACA consists of a sealed ampoule in which the experiment sample material is contained. The SACA accommodates up to six sample thermocouples and has interfaces for sample ampoule/cartridge failure detection sensors.

At least three levels of containment will be provided during sample processing: The SACA, negative ΔP inside the EAC during processing, and the EAC.

At least two levels of containment will be provided during manual sample exchange: The SACA and the flexible glovebox container.

Multiple purge/vent/backfill will be performed prior to manual sample exchange. In addition, a view port is provided on the EAC for visual inspection of the sample ampoules by a crew-member. It is also planned to mount mirrored witness plates inside the EAC to augment

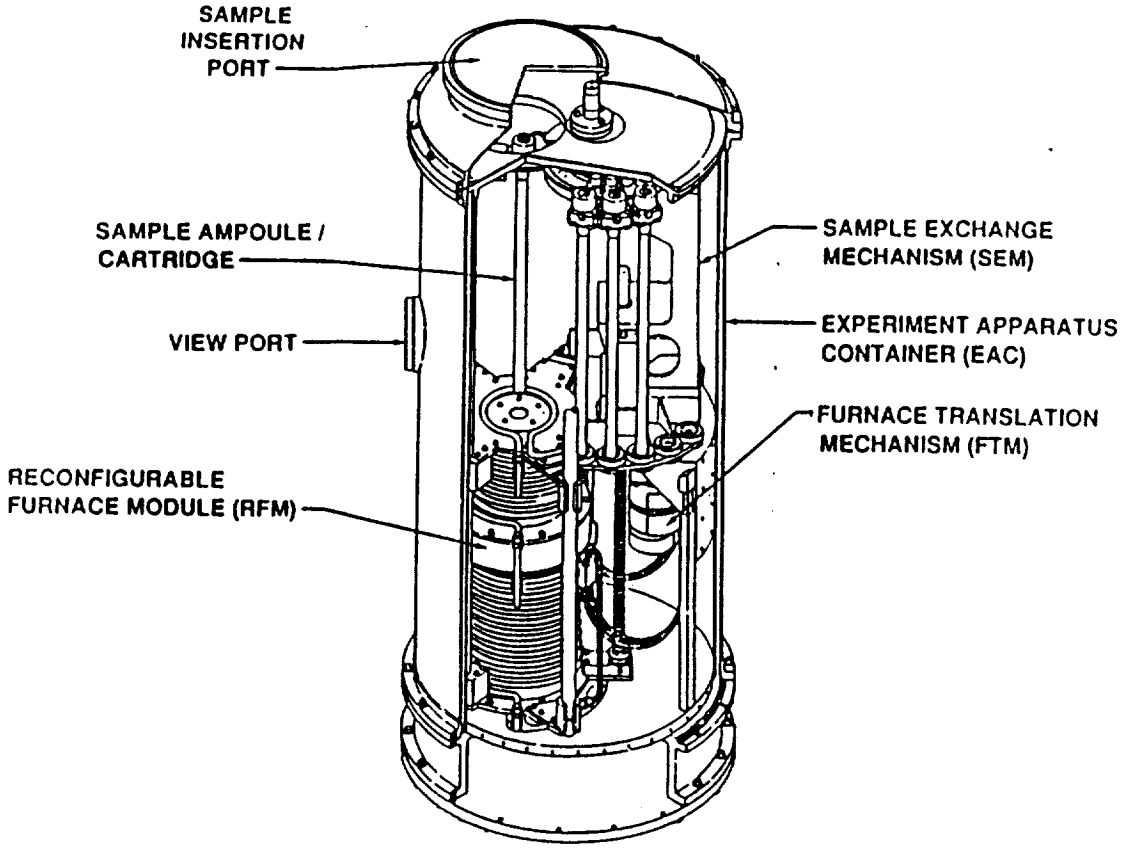


FIGURE 2.1-1. FURNACE MODULE-1 PICTORIAL REPRESENTATION

visual inspection for detecting any vapor deposition that may have resulted from the sample ampoule/cartridge failure. The design will be compatible with the SSFF.

2.1.2 FUNCTIONAL OBJECTIVES

There are nine functional objectives (FOs) for Furnace Module-1 which are structured as one FO for sample exchange, one FO for venting and purging, five FOs for sample processing, one FO for sample loading or shutdown, and one FO for calibration/bakeout. The actual FO numbering is as follows:

- FO-3 Furnace Module-1 Sample Exchange
- FO-4 Furnace Module-1 Vent/Purge
- FO-5 Furnace Module-1 Process Sample HgCdTe
- FO-6 Furnace Module-1 Process Sample HgZnTe
- FO-6A Furnace Module-1 Process Sample Extended HgZnTe
- FO-7 Furnace Module-1 Process Sample CdTe
- FO-8 Furnace Module-1 Process Sample GaAs
- FO-9 Configure Furnace Module-1 for Sample Loading or Shutdown
- FO-11 Furnace Module-1 Process Calibration/Bakeout

Table 2.1-1 shows a listing of the Furnace Module-1 FOs along with the equipment associated with each step of each FO. Step duration, crew time requirements, and average power requirements for each step of each FO are defined in Table 2.1-2, Functional Objective Requirements Sheets.

2.1.3 EQUIPMENT IDENTIFICATION

Figure 2.1-2 identifies the Furnace Module-1 components in a block diagram format. Figure 2.1-3 identifies the Furnace Module-1 to SSFF interfaces.

2.1.4 OPERATIONAL FUNCTIONAL FLOWS

Preliminary functional flows are shown in Table 2.1-3 for each FO. Functional flows define the function performed, the performing element, and decisions involved in accomplishing each FO.

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 1 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3	Manual Sample Exchange	Crew Interaction Required
Step 1	Command Manual Exchange	DMS
Step 2	Vent/Fill EAC	GDS
Step 3	Equalize EAC Pressure	GDS, DMS
Step 4	Prep Equipment	
Step 5	Open SIP	EAC
Step 6	Insert Samples	EAC
Step 7	Close Sip	EAC
Step 8	Open Valves	
Step 9	Command Man. Exchange Off	DMS
Step 10	Perform Seal Check	DMS, GDS
Step 11	Load List process	DMS
FO-4	Purge EAC	
Step 1	GN_2 Purge Furnace	DMS, GDS
Step 2	Argon Backfill	DMS, GDS
Step 3	Command Sample Process	DMS
Step 4	TCS Configured	TCS
FO-5	Vapor Crystal Growth of HgCdTe	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Activate and Process Heat Cycle	GDS, TCS, DMS
Step 3	Anneal Sample	GDS, TCS, DMS
Step 4	Initiate Vapor Crystal Growth Processing	GDS, TCS, DMS
Step 5	Cool Sample and Extract	GDS, TCS, DMS
Step 6	Cool and Stow	

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 2 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-6	Meltback and Regrowth of HgZnTe	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Initial Soak	GDS, TCS, DMS
Step 4	Translation to Growth Position	GDS, TCS, DMS
Step 5	Final Soak	GDS, TCS, DMS
Step 6	Directional Solidification	GDS, TCS, DMS
Step 7	Cool Sample	GDS, TCS, DMS
Step 8	Stow Sample	GDS, TCS, DMS
FO-6A	Meltback and Regrowth of HgZnTe (extended)	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Initial Soak	GDS, TCS, DMS
Step 4	Translation to Growth Position	GDS, TCS, DMS
Step 5	Final Soak	GDS, TCS, DMS
Step 6	Directional Solidification	GDS, TCS, DMS
Step 7	Cool Sample	GDS, TCS, DMS
Step 8	Stow Sample	GDS, TCS, DMS
FO-7	Growth of CdTe by Dir. Solidification	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Soak	GDS, TCS, DMS
Step 4	Process Sample, Directional Solidification	GDS, TCS, DMS
Step 5	Cool Sample to 400 °C	GDS, TCS, DMS
Step 6	Cool Sample to 200 °C and Stow Sample	GDS, TCS, DMS

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 3 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-8	Growth of GaAs by Dir. Solidification	
Step 1	Activate Furnace Processing	GDS, TCS, DMS
Step 2	Preheat Cycle	GDS, TCS, DMS
Step 3	Process Heat Cycle	GDS, TCS, DMS
Step 4	Soak	GDS, TCS, DMS
Step 5	Translate Furnace/Process Sample	GDS, TCS, DMS
Step 6	Cool Down to 800 °C	GDS, TCS, DMS
Step 7	Cool Down to 200 °C and Stow	GDS, TCS, DMS
FO-9	Configure Furnace for Shutdown/Sample Loading	
Step 1	Verify Furnace Is in Home Position	DMS
Step 2	Furnace Specific Tests	DMS
Step 3	Secure Power From Furnace Module	DMS
FO-11	Furnace Calibration/Bakeout	
Step 1	Activate Calibration/Bakeout	DMS
Step 2	Initiate Calibration	DMS
Step 3	Bakeout/Calibration Process	DMS

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 1 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Manual Sample Exchange
NO. OF PERFORMANCES: MIN.____ DES.____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

FO NUMBER: 3
PREREQUISITE: FO-2
SEQUENCE:
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	32:00	10:00	10:00	7:00	20:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1		1	1	1	1
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0	0	0
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Command "Manual Sample Exchange" on
2	Vent/fill furnace module
3	Equalize furnace module pressure
4	Prep equipment
5	Open SIP
6	Insert samples

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 2 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Manual Sample Exchange
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 3
PREREQUISITE: FO-2
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7	8	9	10	11	
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	3:00	1:00	65:00	4:00	
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1	1	1	1	1	
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0	0	
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Close SIP
8	Open valves
9	Command "Manual Sample Exchange" off
10	Perform seal check
11	Load list process

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 3 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Purge Furnace Module
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 4
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	32:00	10:00	2:00	2:00		
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0		
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	GN2 purge furnace
2	Argon backfill
3	Command sample process
4	TCS configured

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 4 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Vapor Crystal Growth of HgCdTe
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 5
PREREQUISITE: FO-3
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	188:00	60:00	480:00	240:00	21:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	1.116	.466	.466	.120	.120
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Activate and process heat cycle
3	Anneal sample
4	Initiate vapor crystal growth processing
5	Cool sample and extract
6	Cool and stow

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 5 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback and Regrowth of HgZnTe
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 6
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	7390:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	.598	.516	.516	.516	.516
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 6 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback & Regrowth of HgZnTe
NO. OF PERFORMANCES: MIN.____ DES.____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

FO NUMBER: 6
PREREQUISITE: FO-3
SEQUENCE:
JOINT OPS WITH:

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.191	.061				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 7 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 6A
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	59957:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	.598	.516	.516	.516	.516
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 8 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 6A
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.191	.061				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Internally stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 9 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Growth of CdTe by Directional Solidification
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 7
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	538:00	120:00	4278:00	438:00	208:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	1.345	1.241	1.166	.591	.241
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module for processing
2	Process heat cycle
3	Soak
4	Process sample, directional solidification
5	Cool sample to 400 °C
6	Cool sample to 200 °C and internally stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 10 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Growth of GaAs by directional Solidification
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 8
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	45:00	227:00	68:00	720:00	210:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	.858	2.353	1.344	1.259	.668
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module processing
2	Preheat cycle
3	Process heat cycle
4	Soak
5	Translate furnace/process sample
6	Cool down to 800 °C

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 11 of 13)

EXPERMENT NAME: Space Station Furnce Facility
FO NAME: Growth of GaAs by Directional Solidification
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 8
PREREQUISITE: FO-3
SEQUENCE: _____
JOINT OPS WITH: _____

STEP NUMBER		7					
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	466:00					
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120					
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool down to 200 °C and internally stow

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 12 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Configure Furnace for Shutdown/Sample loading
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 9
PREREQUISITE:_____
SEQUENCE:_____
JOINT OPS WITH:_____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Verify furnace is in home position
2	Furnace specific tests
3	CCU secures power from furnace module

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 13 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Furnace Calibration/Bakeout
NO. OF PERFORMANCES: MIN._____ DES._____
REQUIRED TIMEFRAME (MET): MIN.____ MAX._____

FO NUMBER: 11
PREREQUISITE: FO-3
SEQUENCE:
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	1:00	300:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1336	2.330			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate calibration/bakeout
2	Initiate calibration
3	Bakeout/calibration process

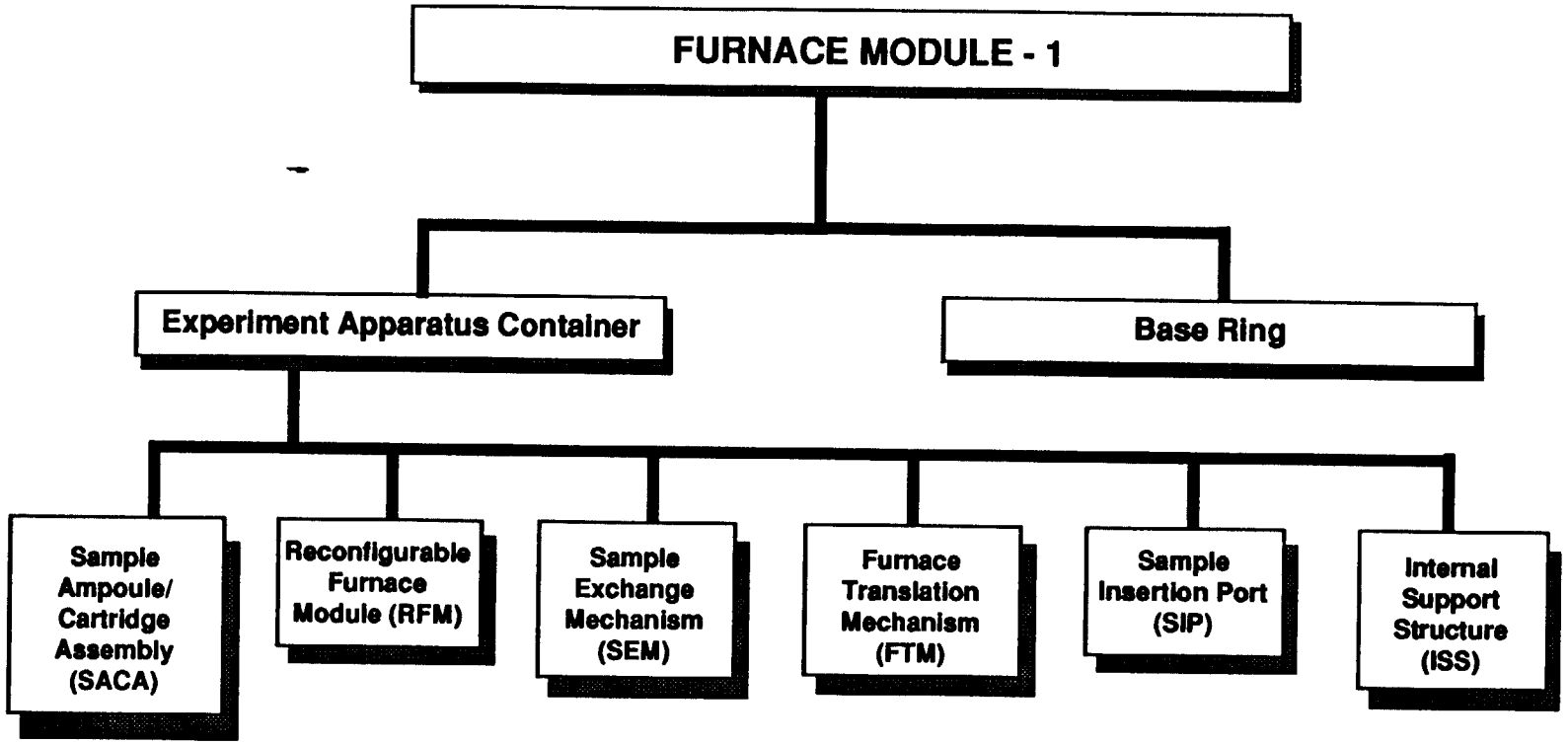


FIGURE 2.1-2. FURNACE MODULE-1 COMPONENT TREE

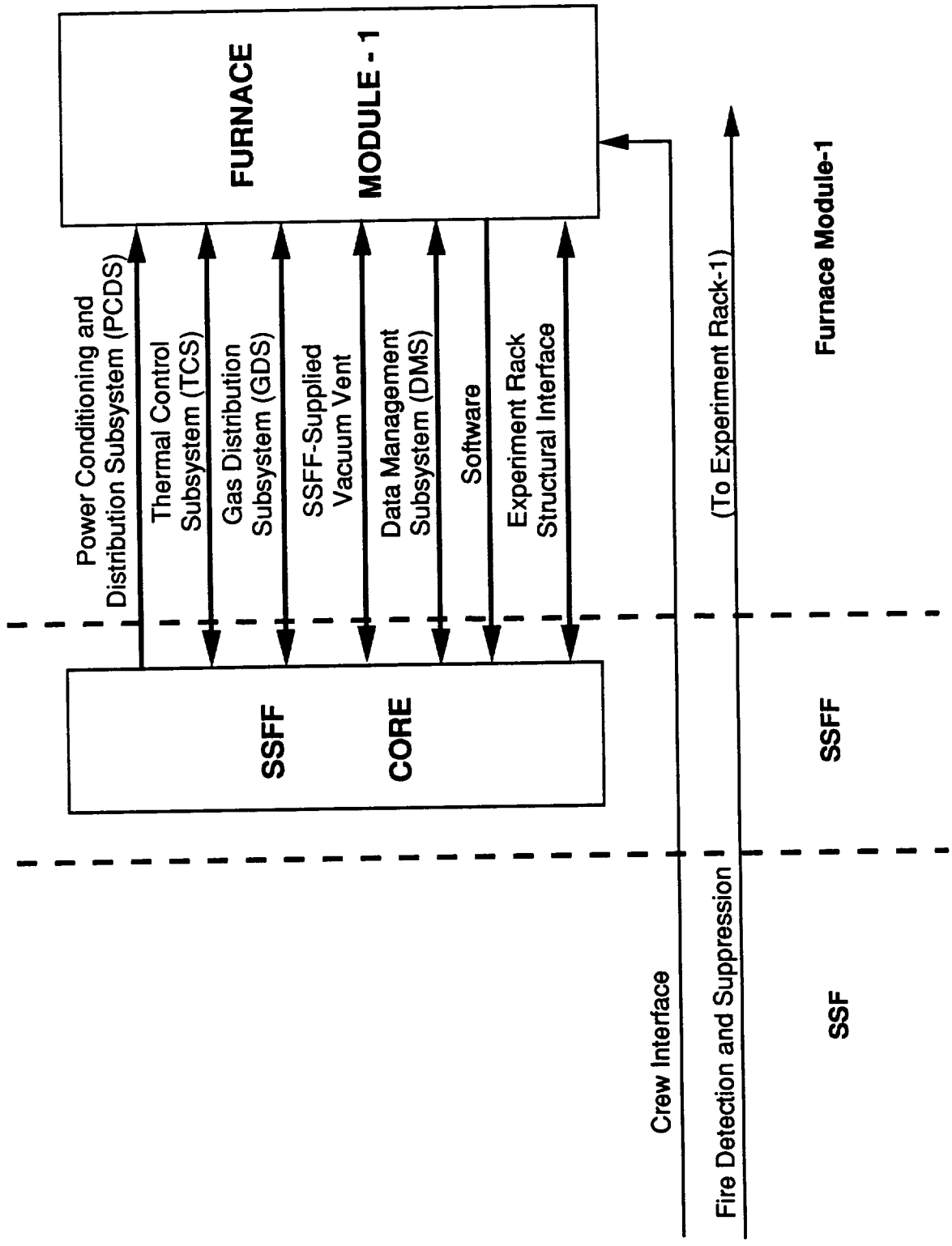


FIGURE 2.1-3. FURNACE MODULE-1 TO SSFF/SSF INTERFACE DIAGRAM

TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 1 of 12)

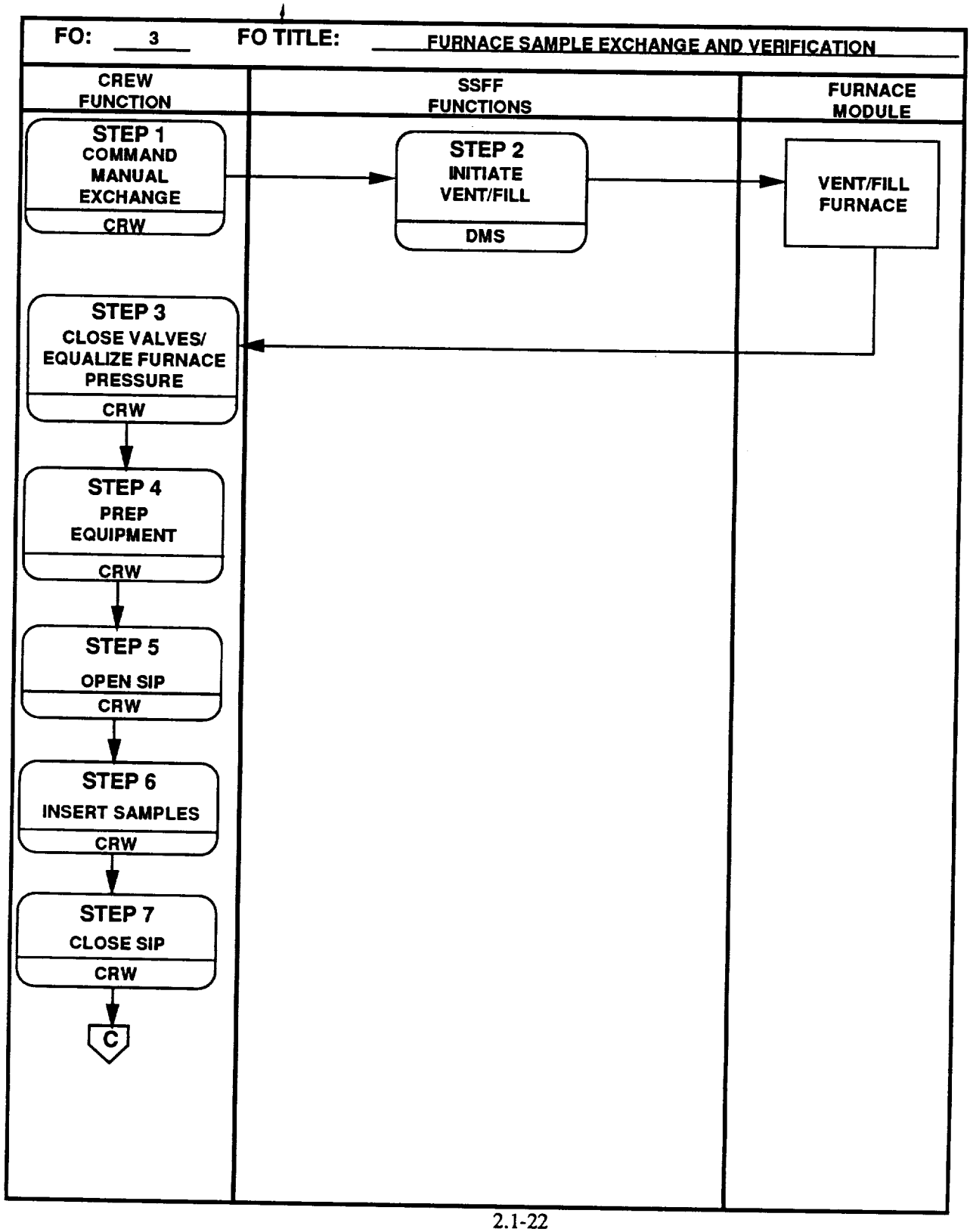


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 2 of 12)

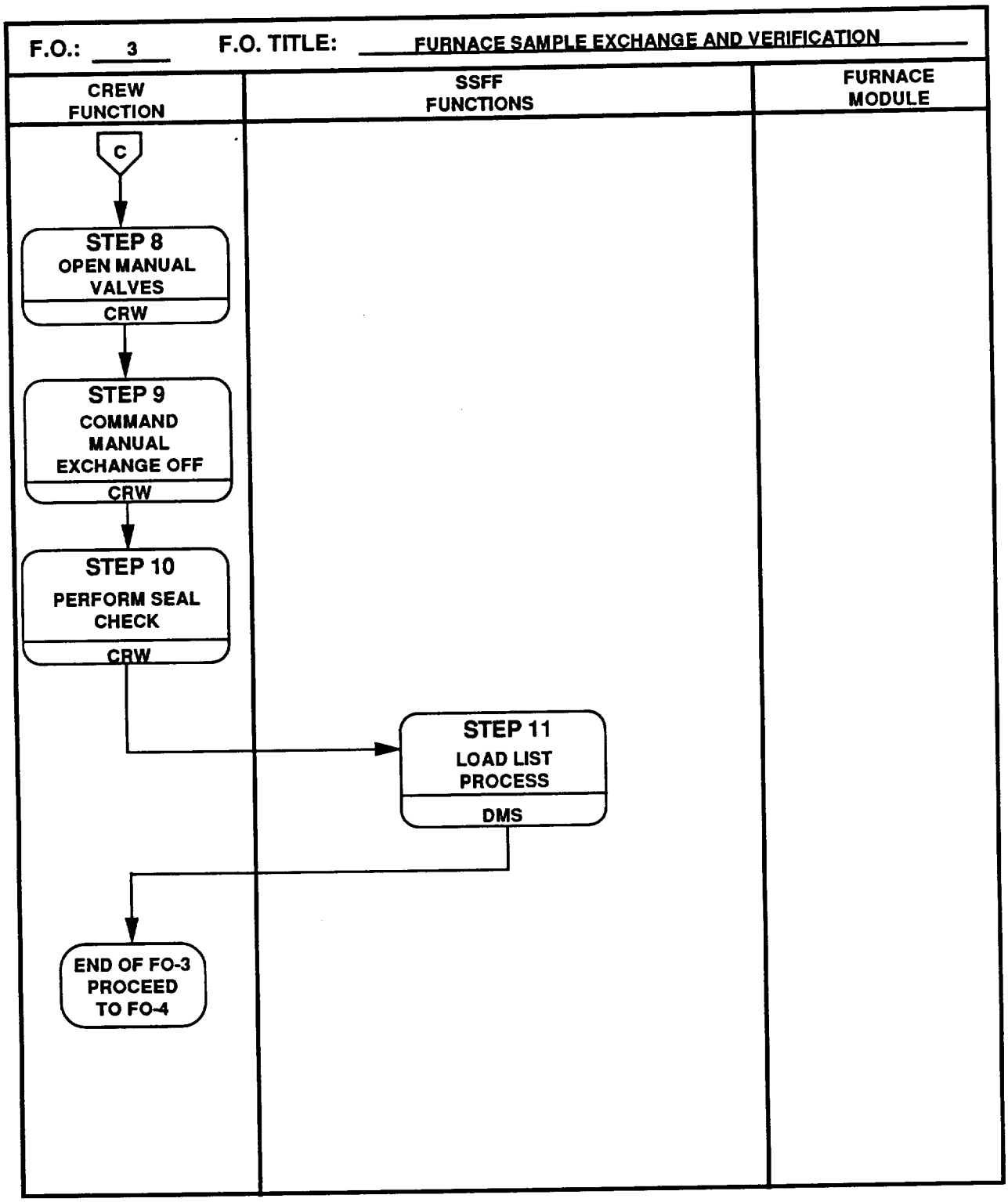


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 3 of 12)

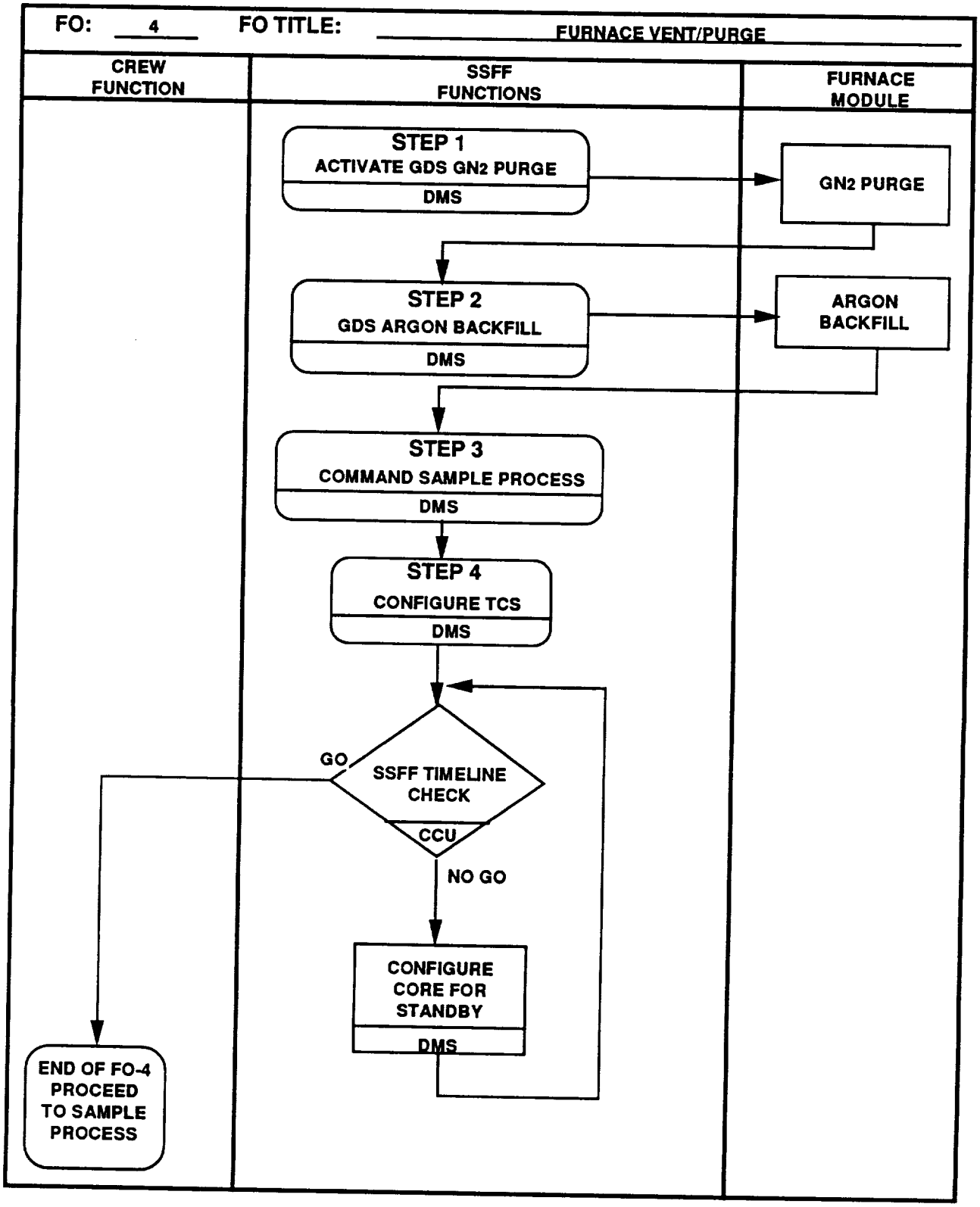


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 4 of 12)

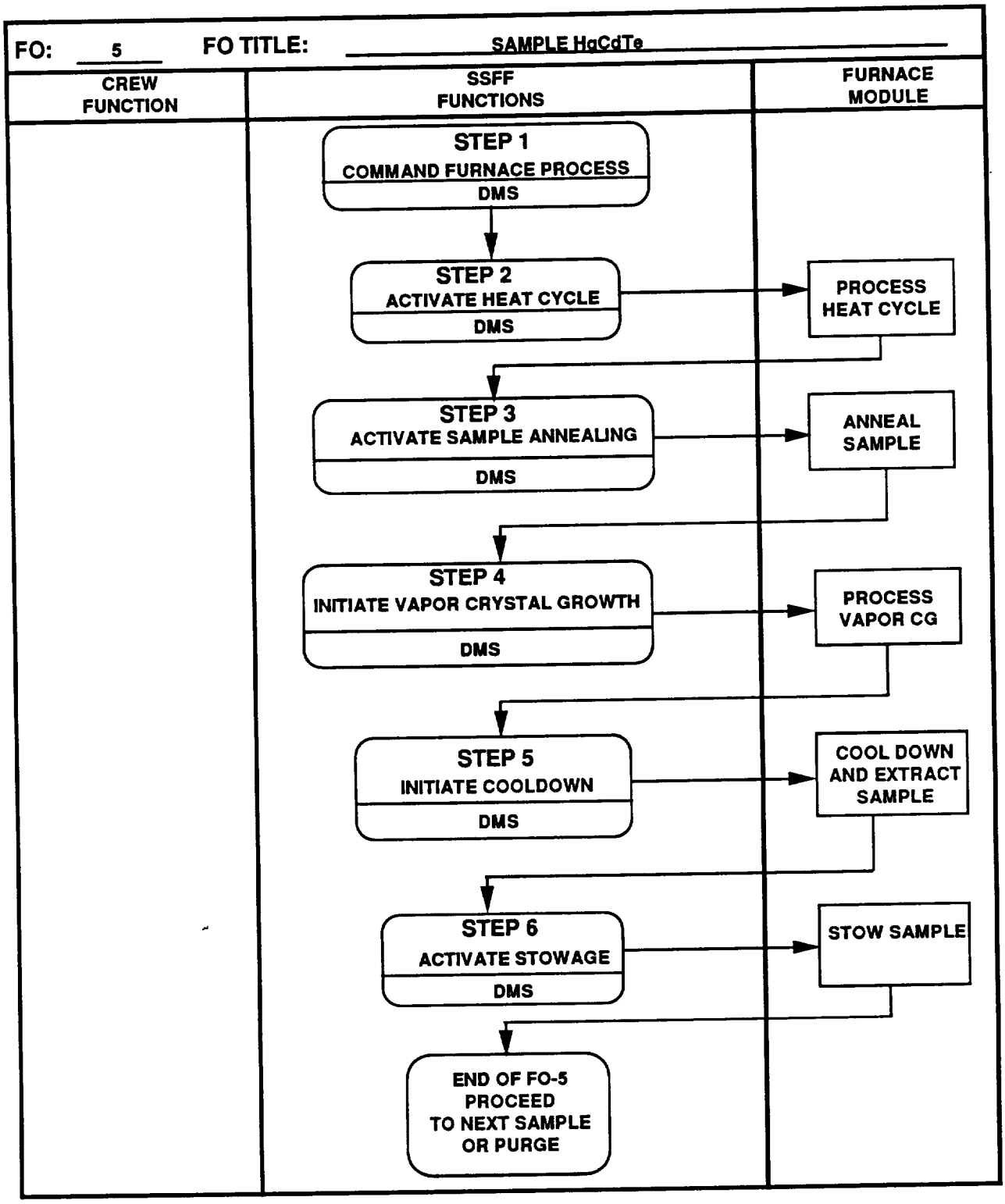


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 5 of 12)

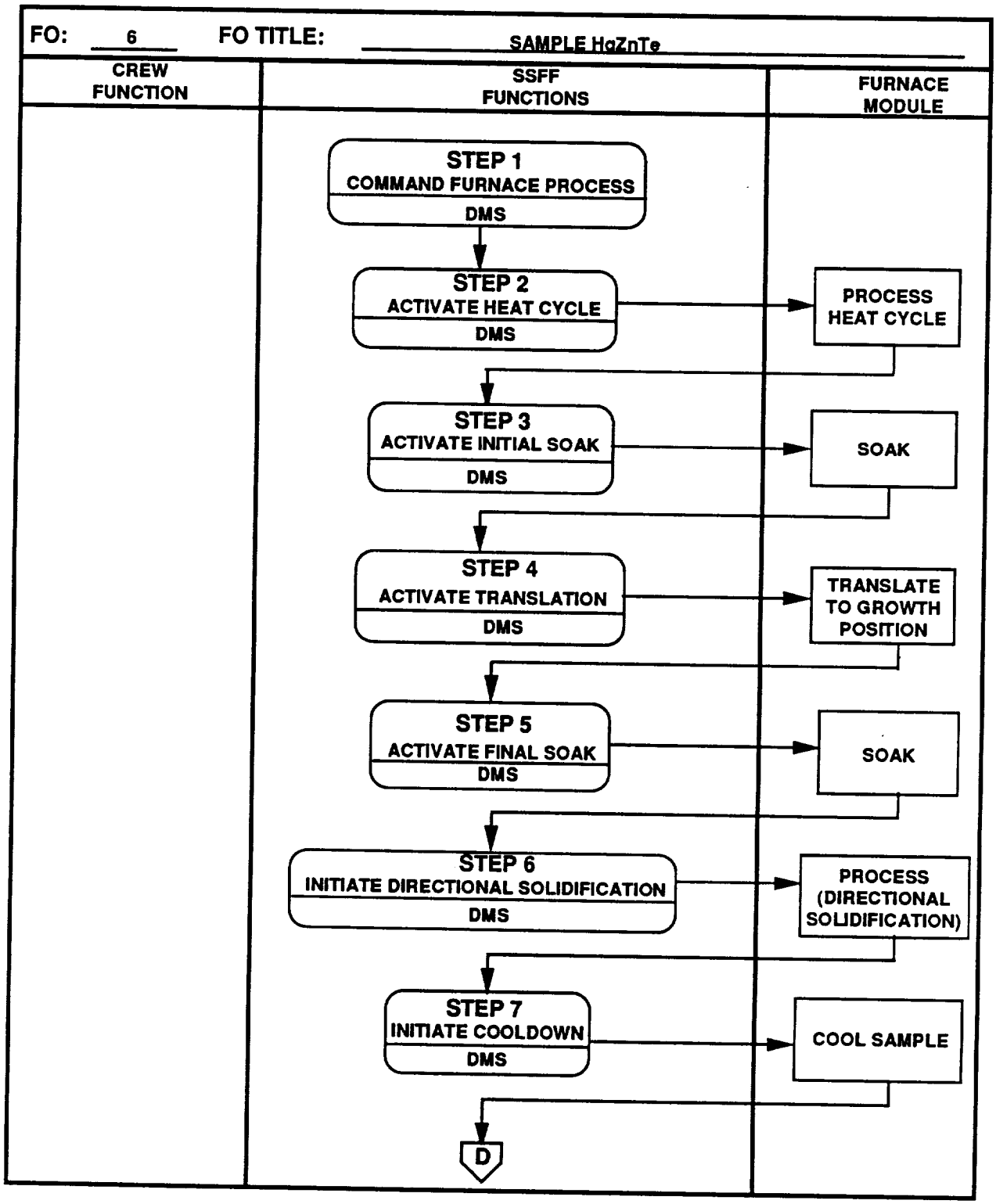


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 6 of 12)

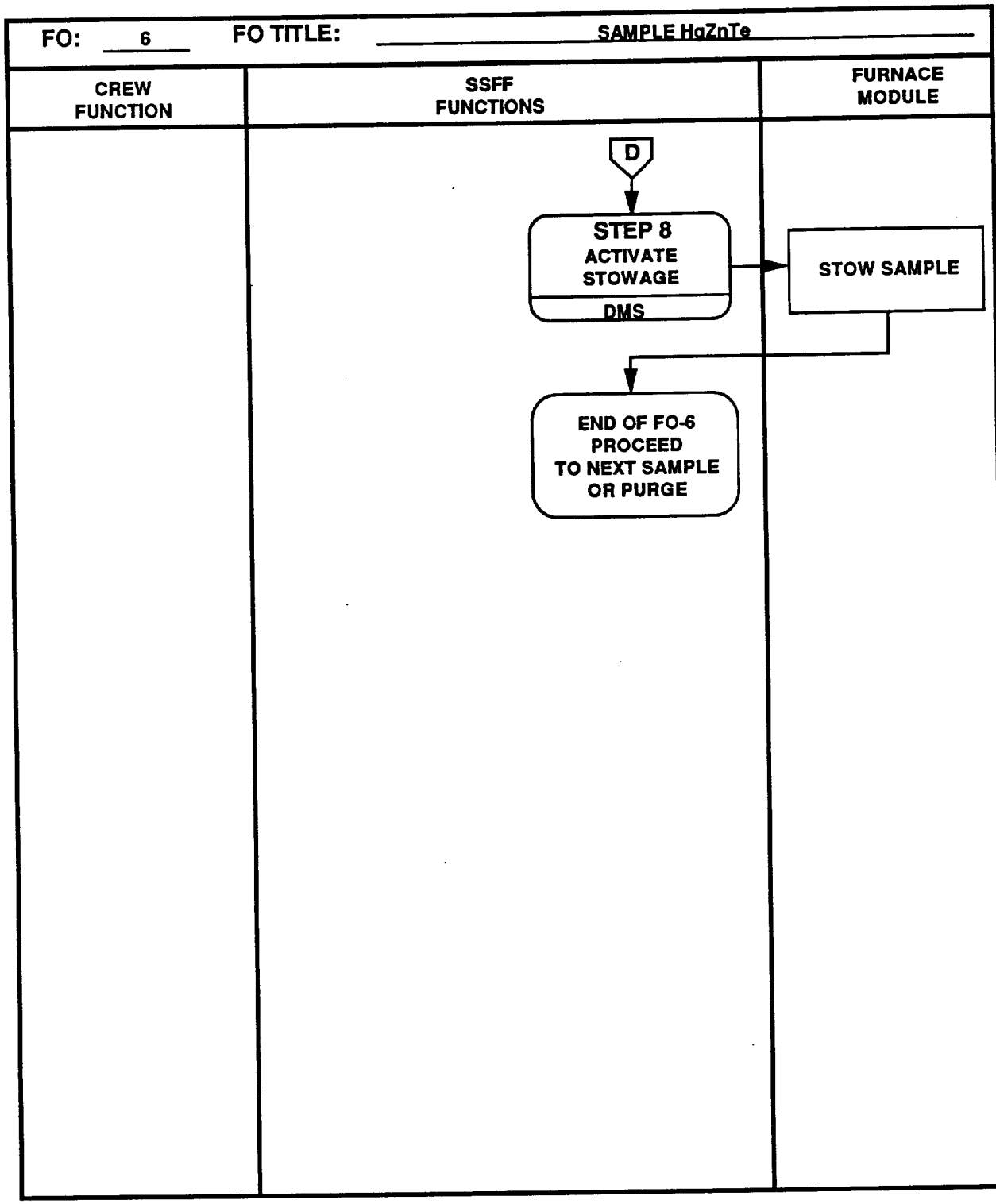


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 7 of 12)

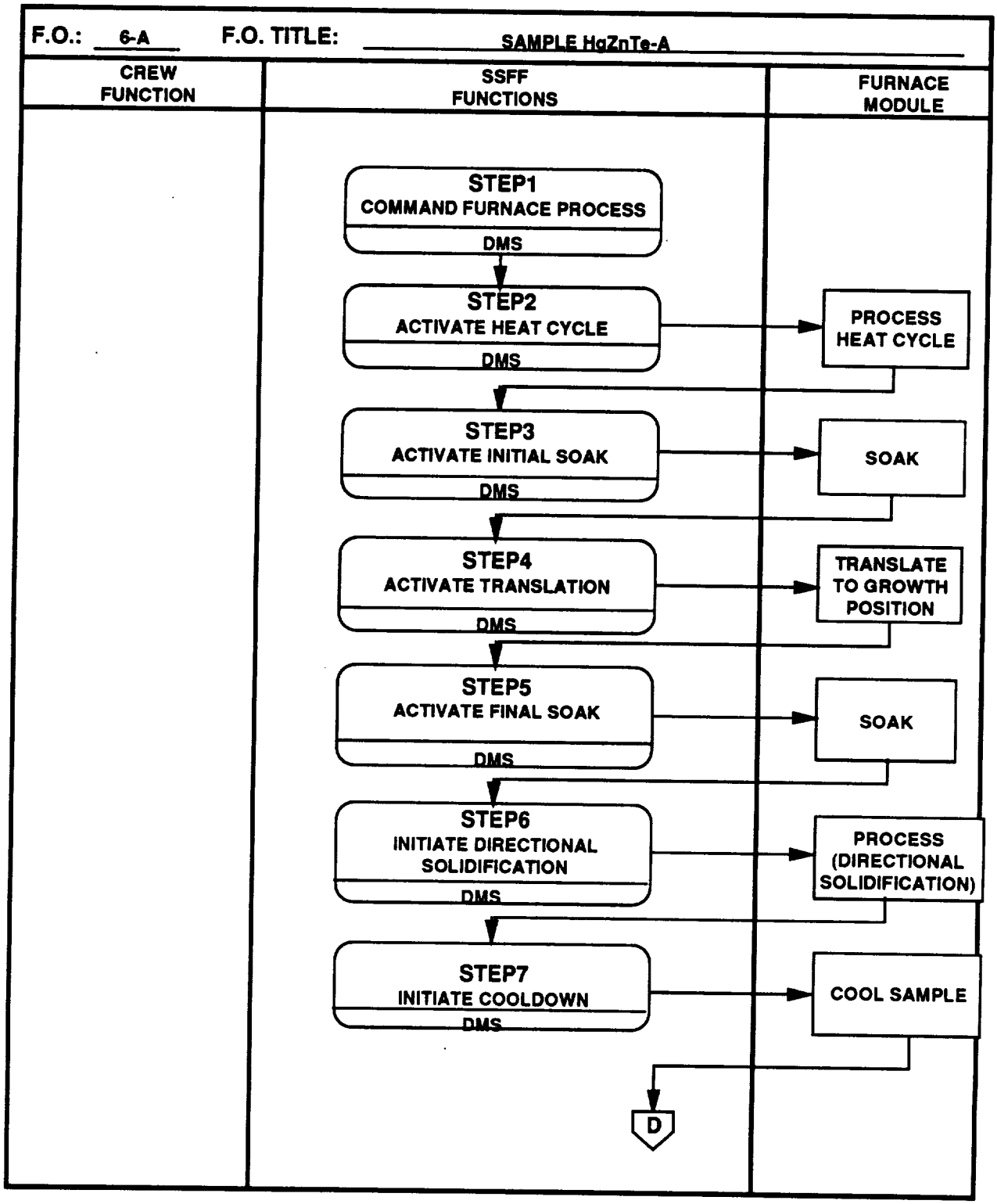


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 8 of 12)

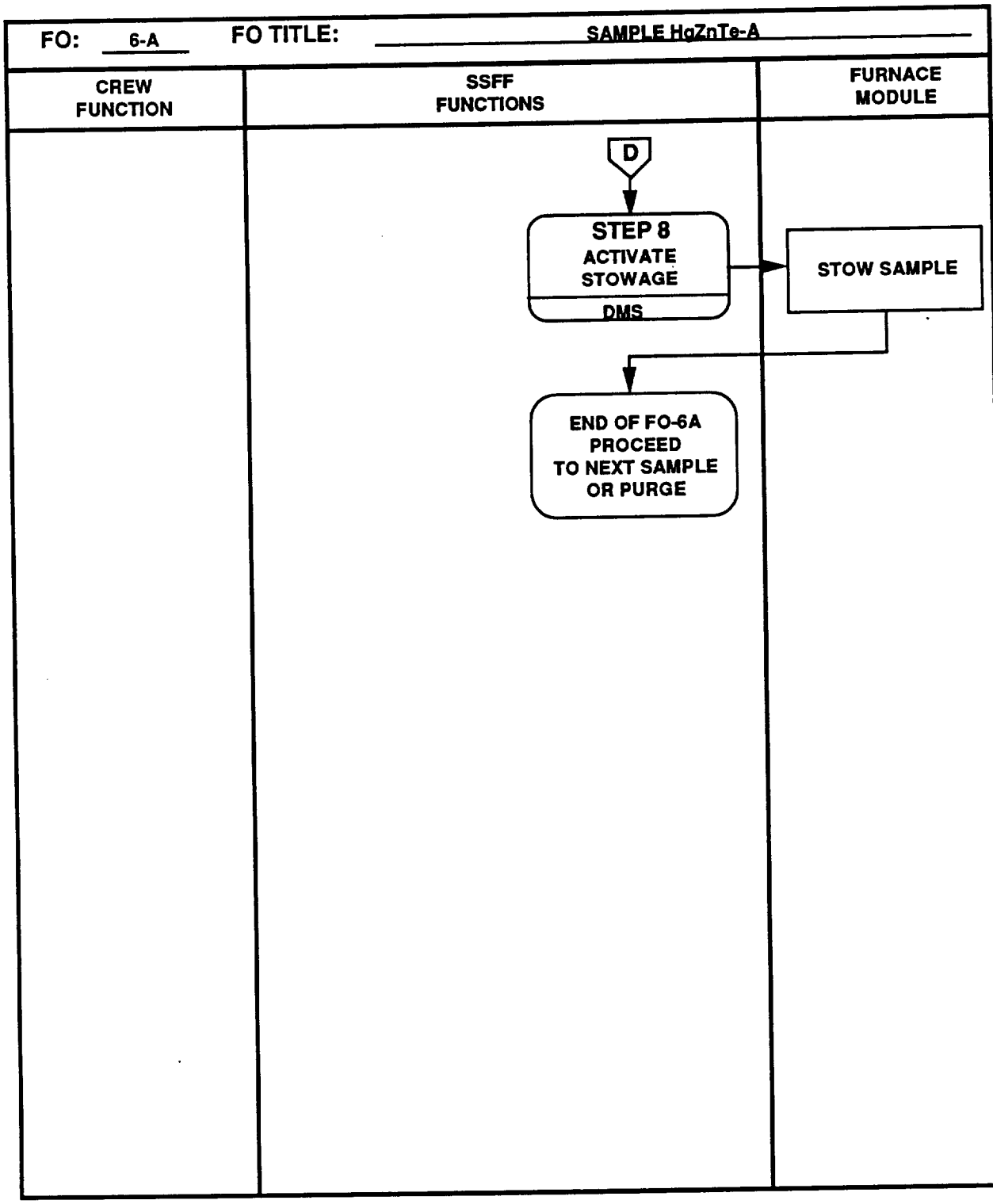


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 9 of 12)

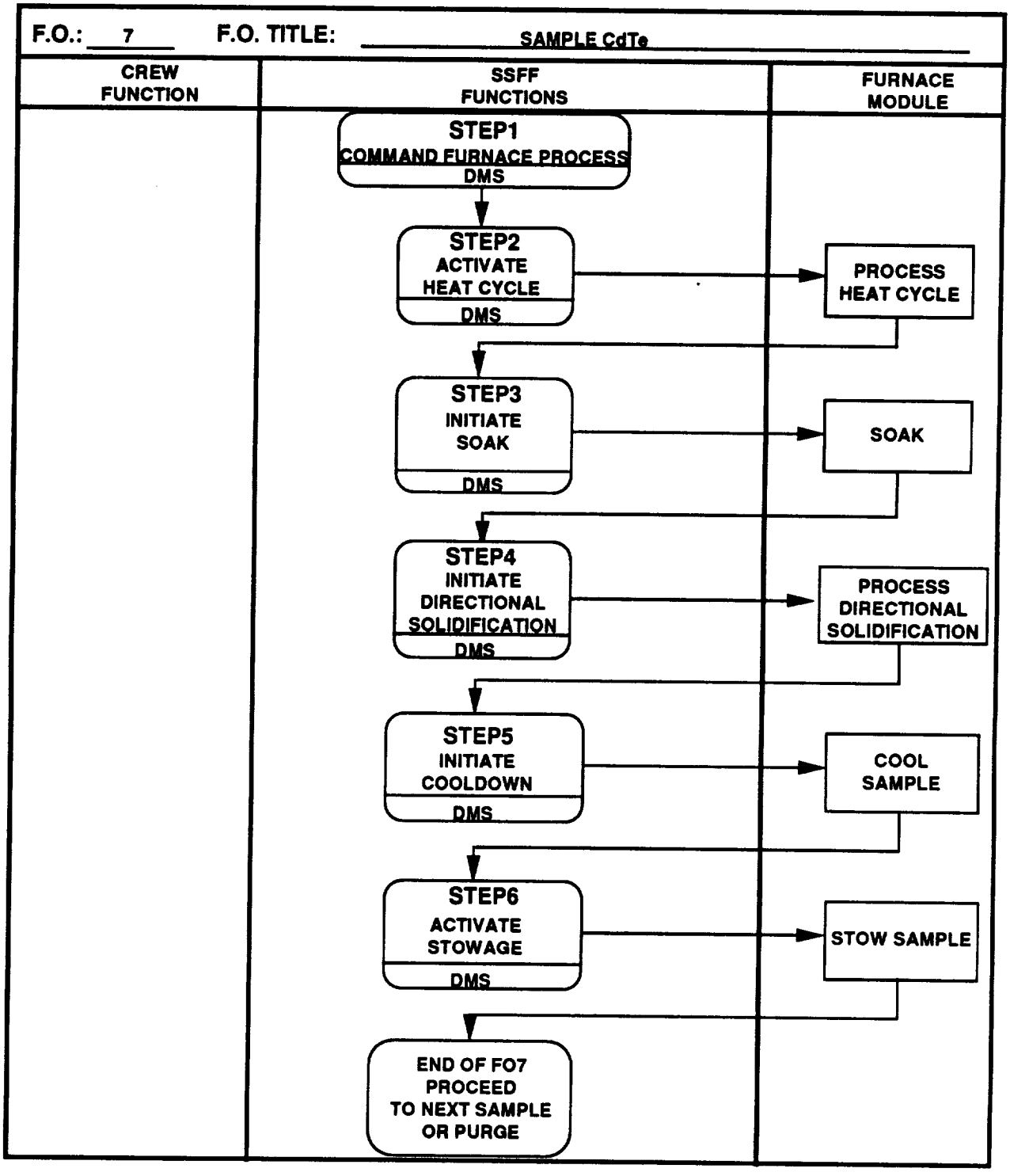


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 10 of 12)

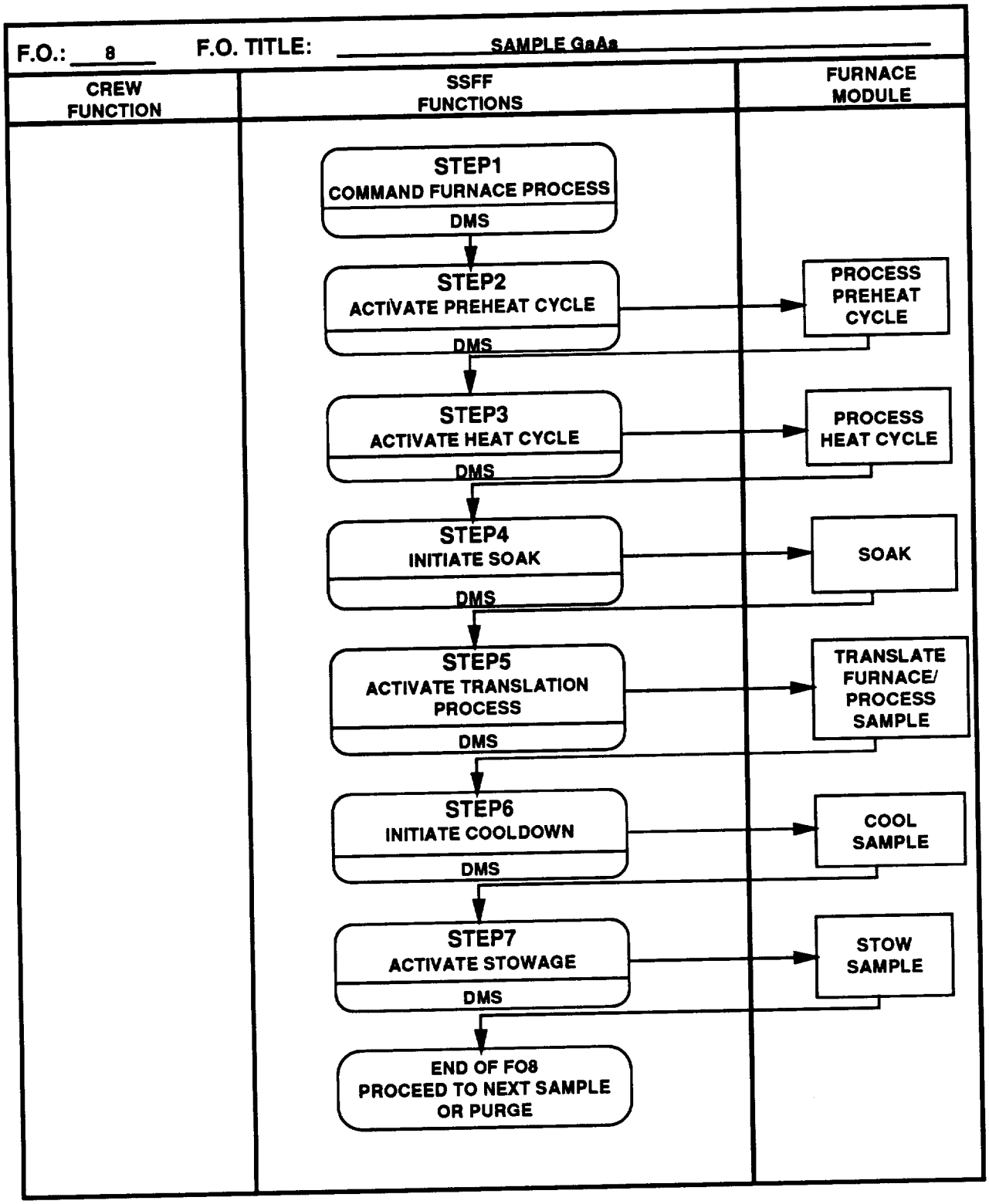


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 11 of 12)

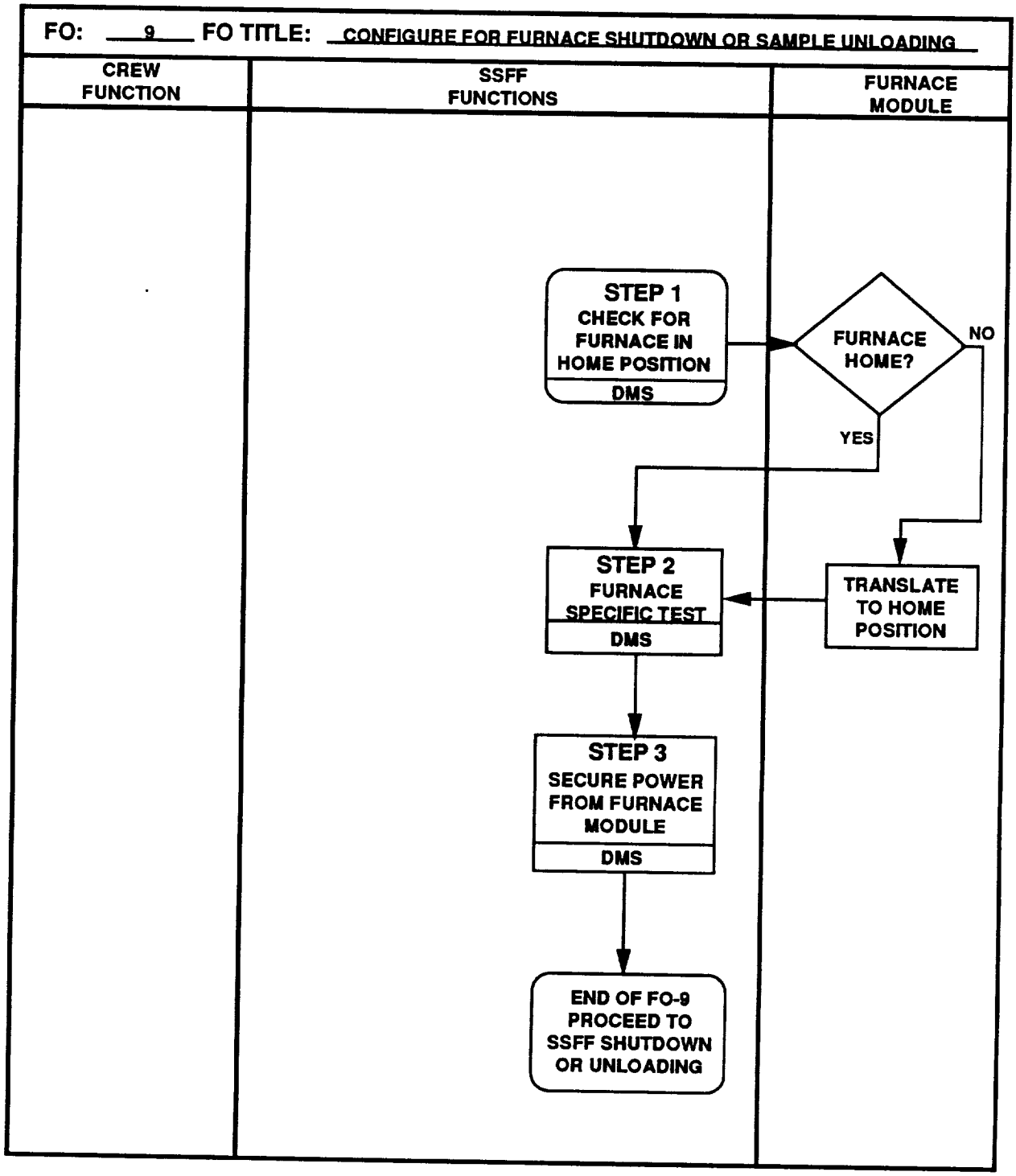
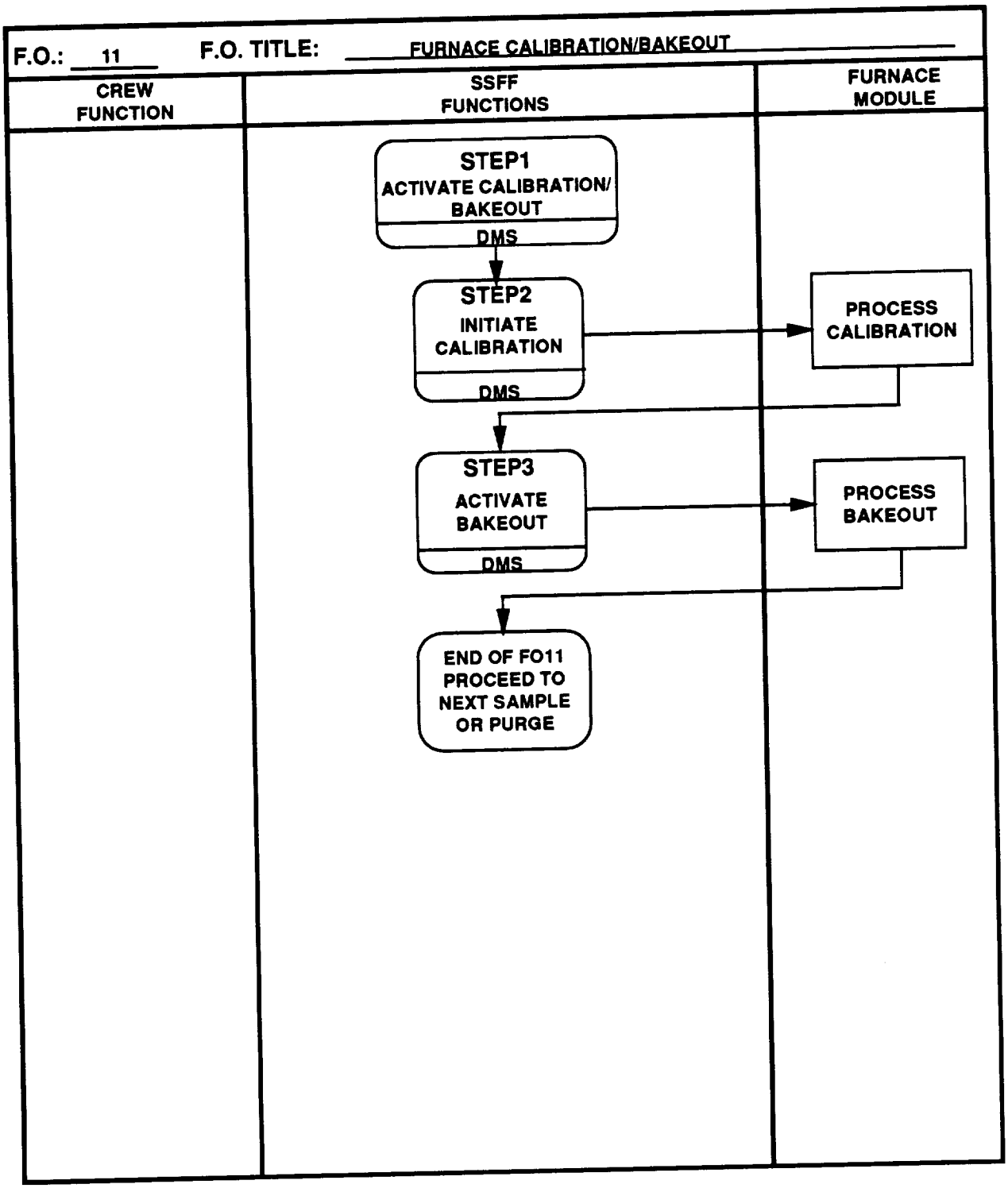


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 12 of 12)



2.2. STRUCTURAL/MECHANICAL

Furnace Module-1 will be mounted in the Space Station Furnace Facility (SSFF) Experiment Rack-1. The physical and functional interfaces defined herein between Furnace Module-1 and SSFF, and Furnace Module-1 and Space Station Freedom (SSF) are as follows:

- Furnace Module-1 to SSFF Experiment Rack-1
- Furnace Module-1 cooling jacket to SSFF Thermal Control System (TCS)
- Furnace Module-1 electrical connection to SSFF Power Conditioning and Distribution System (PCDS)
- Furnace Module-1 to SSFF-supplied argon and nitrogen
- Furnace Module-1 to SSFF-supplied vacuum vent
- Furnace Module-1 Data Management System (DMS) connections to SSFF DMS
- Furnace Module-1 software to SSFF software
- Furnace Module-1 to crew interface

2.2.1 EQUIPMENT LIST AND MASS PROPERTIES

Mass properties of Furnace Module-1 are shown in Table 2.2-1. Stowage items and their properties are shown in Table 2.2-2.

2.2.2 INTERFACE DETAIL

2.2.2.1 Furnace Module-1 to SSFF Experiment Rack-1

The Furnace Module-1 will interface with the experiment rack by way of the experiment apparatus container (EAC) base ring. The EAC connector locations for the TCS, PCDS, argon, nitrogen, vacuum vent, and DMS are identified in Figure 2.2-1. Further information on each of these interfaces is available in this section of this document.

All services will be provided to Furnace Module-1 by the Core Rack, except avionics air and fire detection and suppression, which will be provided at Experiment Rack-1 via the SSFF furnace interface panel. Other furnace-unique services which might be required will be the responsibility of the Furnace Developer and will be located in Experiment Rack-1.

2.2.2.2 Furnace Module-1 Cooling Jacket-to-SSFF TCS

Furnace Module-1 will interface with the SSFF TCS via quick disconnects located at the Furnace Module-1 base ring.

TABLE 2.2-1. LIST OF EQUIPMENT PROPERTIES

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
Furnace Module-1	327.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Utilities Interface Panel	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Interface Cables and Fluid Lines	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 2.2-2. FURNACE MODULE-1 STOWAGE LIST

Item	Number Required	Mass Each (kg)	Dimensions (cm) LxWxH or LxDia	Stowage Responsiblity		Stowage Phase			Special Requirements
				Ex	PL	L	O	R	
Sample Ampoule/Cartridge Assembly with Stowage Bag (5 flight and 5 spares)	10	1.60	73.7 x 13.2 dia.			√		√	
Work Bag	TBD	0.07	45.7 x 5.1 dia.			√		√	
Glovebox Cover	1	TBD	TBD			√		√	
Flexible Glovebox	1	TBD	TBD			√		√	
Torque Wrench, 1/4 in. (30-200 in-lb)	1	0.31	24.1 x 2.1 X 1.9			√		√	
Socket, 1/2 in. deep, (1/4-in. drive)	1	0.09	5.1 x 1.7 dia.			√		√	
Extender, 10 in. (1/4-in. drive)	1	0.10	25.4 x 1.3 dia.			√		√	
Hex Head Driver, 5/32 in. (3/8-in. drive)	1	0.01	5.2 x 1.3 dia.			√		√	
Hex Head Driver, 1/4 in. (3/8-in. drive)	1	0.01	5.2 x 1.3 dia.			√		√	
Adapter, 1/4 to 3/8 in. (1/4-in. drive)	1	0.02	2.4 x 1.3 dia.			√		√	
Viton Gloves (pair)	1	0.41	14.0 x 22.9 x 3.8			√		√	
Filter Test Bags	10	0.01	15.2 x 15.2 x 0.5			√		√	
SACA Wrench	1	0.26	76.2 x 5.2 dia.			√		√	
Torque Wrench (0-30 in-lb)	1	0.40	17.8 x 3.2 dia.			√		√	
Transfer Units	10	0.26	20.6 x 9.1 dia.			√		√	

TBD

FIGURE 2.2-1. FURNACE MODULE-1 EAC CONNECTOR LOCATIONS

2.2.2.3 Furnace Module-1 Electrical Connection-to-SSFF PCDS

The furnace module will interface with the SSFF PCDS via the furnace junction box located within Experiment Rack-1 to the Furnace Module-1 base ring connection.

2.2.2.4 Furnace Module-1 to SSFF-Supplied Argon and Nitrogen

Furnace Module-1 will interface with the SSFF Core Rack-supplied argon and nitrogen through a connection at the Furnace Module-1 base ring.

2.2.2.5 Furnace Module-1 to SSFF-Supplied Vacuum Vent

Furnace Module-1 will interface with the SSF-supplied vacuum vent through a connection at the Furnace Module-1 base ring.

2.2.2.6 Furnace Module-1 DMS Connections-to-SSFF DMS

The furnace module will interface with the SSFF DMS via the Furnace Data Acquisition and Control System (FDACS) located within Experiment Rack-1.

2.2.2.7 Furnace Module-1 Software-to-SSFF Software

The Furnace Module-1 software will require an interface with the SSFF software to support operation of the furnace module. This interface will include (1) downloading software and data to the Furnace Module-1 software; (2) collecting and processing (if necessary) data received from the Furnace Module-1 software; (3) responding to requests for SSFF resources such as power, gas, cooling, etc.; (4) retrieving stored data to be output to Furnace Module-1 for analysis; (5) network management of the local area network (LAN) connected to the Furnace Module-1 processor; (6) fault, detection, isolation, and recovery (FDIR) services; and (6) operating system services. Furnace Module-1 will also require interface from the SSFF software to the furnace heating system, the furnace translation system (if present), the furnace cavity pressure system, and the furnace current pulsing system.

2.2.2.8 Furnace Module-1 to Crew Interface

There are two ways the crew may interface with Furnace Module 1. The first way is through the top end of the EAC where the crew interfaces with the integrated furnace enclosure apparatus (IFEA) via the sample insertion port during manual sample exchange.

The second way the crew may interface with Furnace Module-1 is through the crew interface to the SSFF DMS (display and keyboard). Through the display and keyboard, a crewmember can direct the furnace to perform any number of operations including changing temperature profiles or rotating and loading a different sample into the processing position.

2.3. POINTING/STABILIZATION AND ALIGNMENT

Furnace Module-1 requires specific alignment of the center line of the sample during processing. This requirement is that the residual dc acceleration vector (i.e., dc component of the acceleration vector at the sample due to all factors such as drag, orbital mechanics, etc.) should be aligned with the center line of the sample precisely enough that the component of the acceleration perpendicular to the center line is less than 10^{-7}g. The direction of the vector may be required to be from hot zone to cold zone of the furnace or the opposite direction. The required direction will be determined separately for each sample.

2.4. ORBITAL REQUIREMENTS AND CONSTRAINTS

Furnace Module-1 requires specific Orbiter attitudes during processing in order to satisfy the requirement for orienting the reconfiguring furnace module (RFM) axis in relation to the residual dc acceleration vector. Details of the attitude requirements are to meet the requirements of Section 2.3.

2.5. ELECTRICAL REQUIREMENTS

All power conditioning will be accomplished by Space Station Furnace Facility (SSFF) prior to any distribution to Furnace Module-1. Furnace Module-1 heaters will interface with the Power Conditioning and Distribution System (PCDS) at the furnace junction boxes. The operational power profile defining the use of the SSFF-provided power to Furnace Module-1 during each functional objective (FO) is shown in Figure 2.5-1. The power profile data shown in these figures represent power requirement estimates to cover any of the the SSFF-accommodated furnace needs. Only FO-5 through FO-8 power profiles are shown since no power is associated with the furnace in FO-3, FO-4, FO-9, or FO-11. The power levels defined in Figure 2.5-1 are considered maximums. Time duration for peak power requirements is 72 h. The maximum peak power required is 1650 W. The average power required is 570 W.

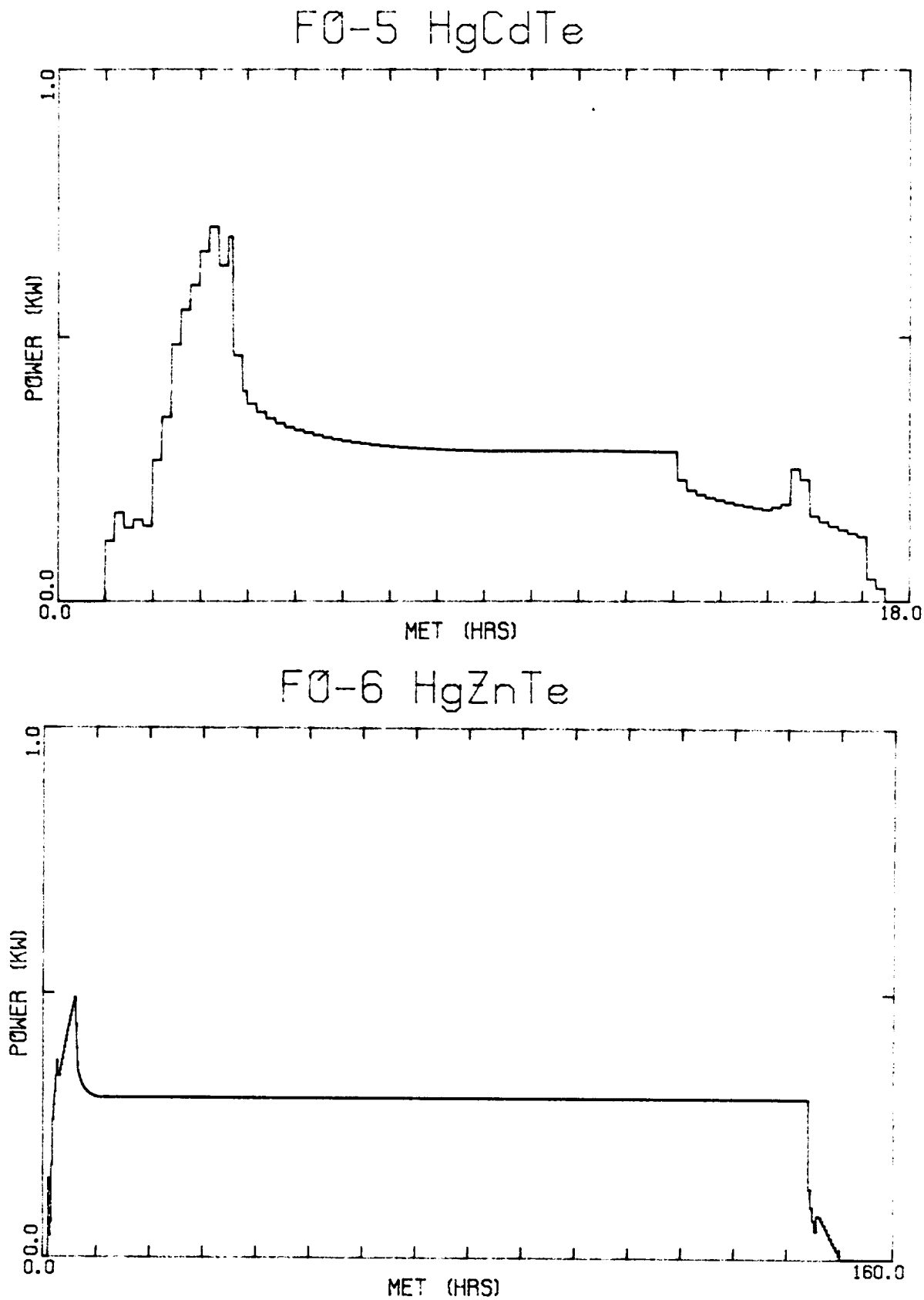


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 1 of 3)

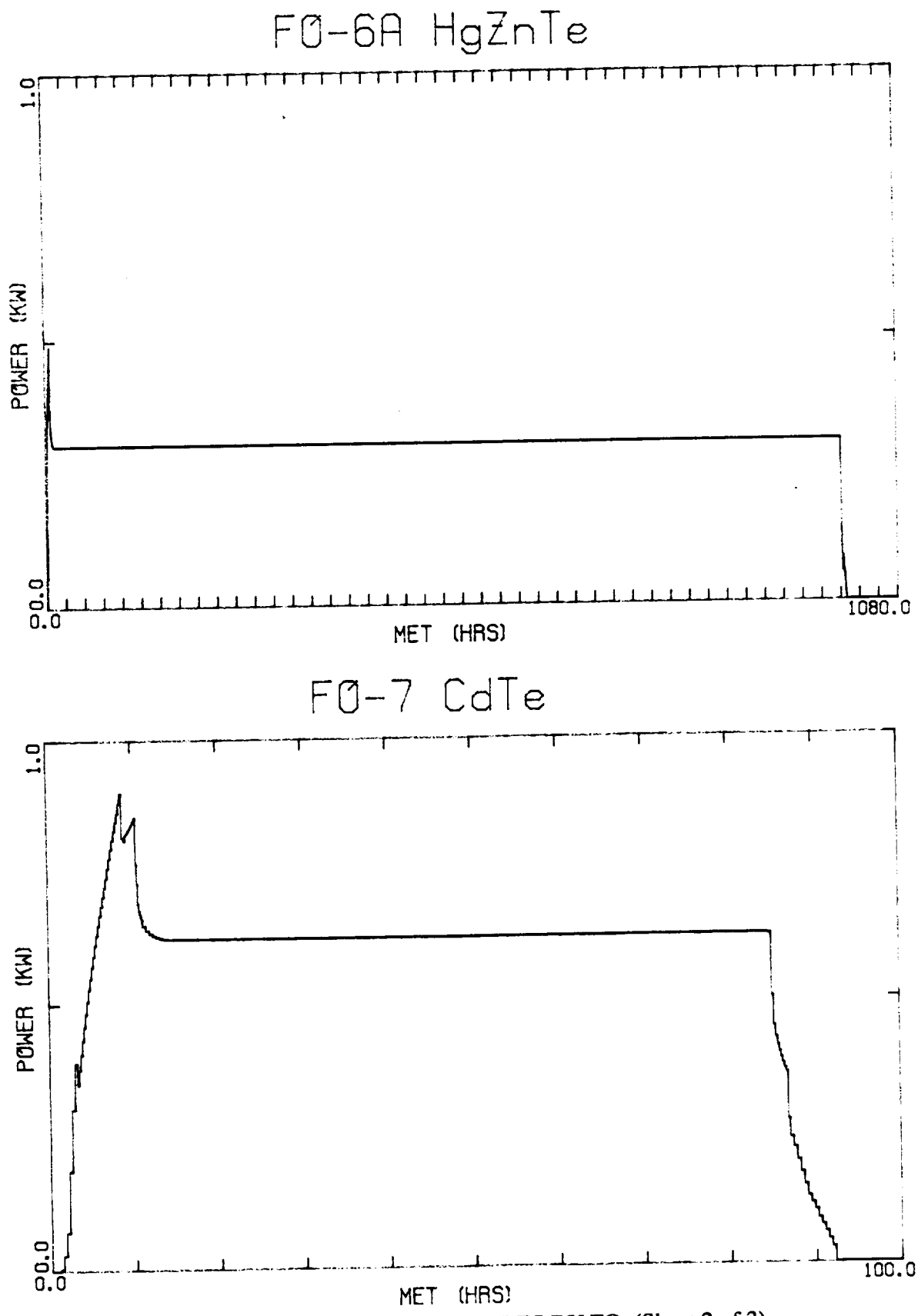


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 2 of 3)

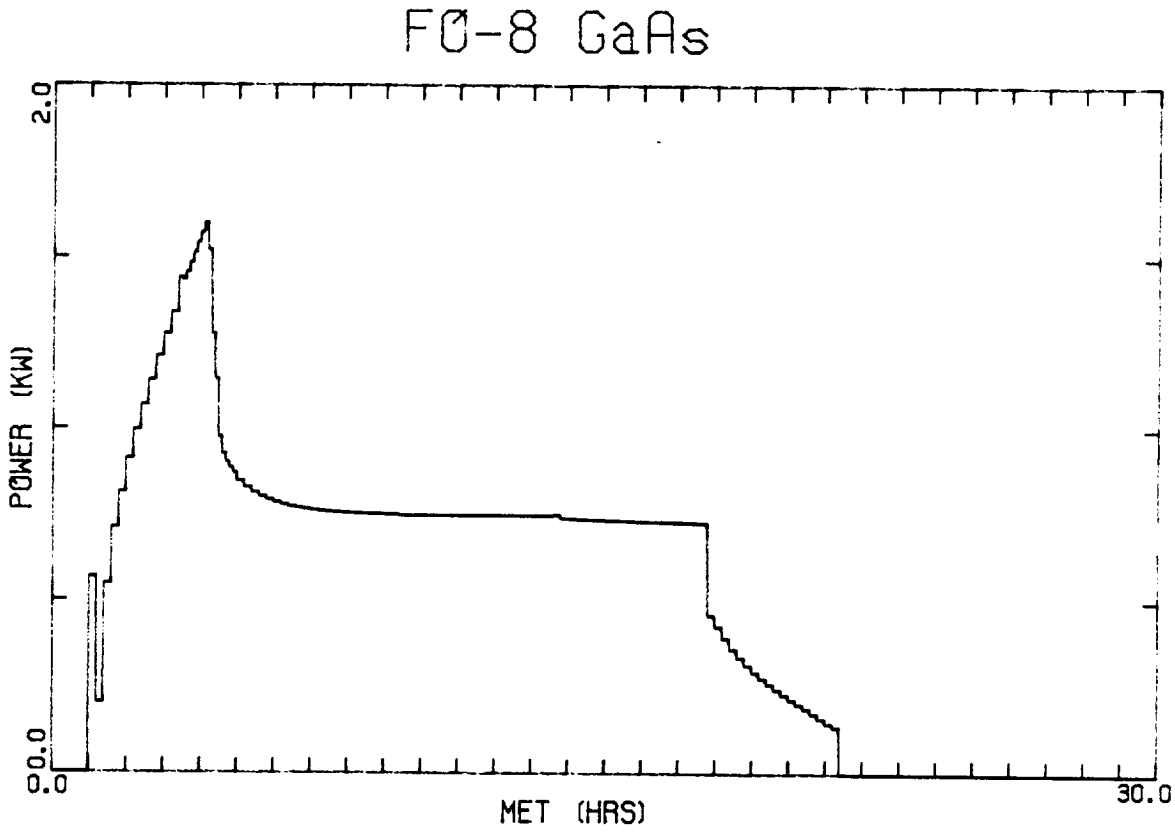


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 3 of 3)

2.6. THERMAL/FLUID REQUIREMENTS

2.6.1 HEAT TRANSFER CHARACTERISTICS

Furnace Module-1 utilizes the Space Station Furnace Facility (SSFF) water cooling loop for experiment cooling and will not require avionics air cooling. Thermal requirements for Furnace Module-1 are shown in Table 2.6-1. Maximum water-cooled heat dissipation from Experiment Rack-1 is 1500 W for Furnace Module-1. Required inlet temperature of the cooling water for Furnace Module-1 is 39.9 °C.

2.6.2 FLUID/VENT REQUIREMENTS

Furnace Module-1 requires an argon processing atmosphere. Argon required by Furnace Module-1 for the Integrated Configuration-1 (IC1) mission is 7.5 kg. The supplied argon is required to be research grade having the following contaminant levels:

99.9995 % pure	N_2 < 3.0 ppm
CO_2 < 0.5 ppm	N_2O < 0.1 ppm
CO < 1.0 ppm	O_2 < 1.0 ppm
H_2 < 1.0 ppm	THC < 0.5 ppm
CH_4 < 0.5 ppm	H_2O < 0.5 ppm
dewpoint = -112 °F	

During nominal operating conditions, the vent products for Furnace Module-1 will be argon and nitrogen. Vent products during off-nominal conditions are TBD. Gas and vacuum requirements for Furnace Module-1 are shown in Table 2.6-2.

Furnace Module-1 has two paths to the SSF Vacuum System. The use of these paths is defined as follows:

- Path One - Active Pressure Control
  - Path one is used for Gas Distribution System (GDS)-controlled, or nominal venting.
  - Path one requires access to the Space Station Freedom (SSF) Vacuum System during the sample processing phases of Furnace Module-1 operations.
  - Venting episodes using path one will be SSF timelined activities. Typical vents will occur every 15 min to 1 h.

- Path Two - Emergency Pressure Relief
  - Path two provides for emergency relief of experiment apparatus container (EAC) overpressure through redundant pressure relief valves.
  - Path two must have access to the SSF Vacuum System during all on-orbit phases after installation into the U.S. Laboratory module.

TABLE 2.6-1. ON-ORBIT THERMAL REQUIREMENTS

Equipment Item and FO No.	Heat Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal Capacitance (W-h-°C)	Special Considerations (as applicable)
	Cabin	Rack Air (nonducted)	Rack Air (ducted)	Exp Coldplate (Module)	SSFF Core HX	Standby	Operate	Peak or other	Standby	Operate	Non-Operate		
FO-3					X	0	0	0	0/50	0/50	0/50	TBD	
FO-4					X	0	0	0	0/50	0/50	0/50	TBD	
FO-5					X	TBD	232	270	0/50	0/50	0/50	TBD	
FO-6					X	TBD	274	285	0/50	0/50	0/50	TBD	
FO-6A					X	TBD	283	285	0/50	0/50	0/50	TBD	
FO-7					X	TBD	525	580	0/50	0/50	0/50	TBD	
FO-8					X	TBD	524	697	0/50	0/50	0/50	TBD	
FO-9					X	0	0	0	0/50	0/50	0/50	TBD	
FO-11					X	0	0	0	0/50	0/50	0/50	TBD	

TABLE 2.6-2. FLUID REQUIREMENTS

Equipment Item and FO No.	Functional Requirement (Pressure, Purge, Vent Vacuum)	Gas or Liquid Parameters					Vent		Vacuum Vent Rate: torr-l/sec	Special Considerations (as applicable)
		Type	Quantity Stored (kg)	Pressure Limits (N/m2)	Flow-rate (kg/h)	Pressure Drop (N/m2)	Pressure (N/m2)	When Required and Duration		
FO-3 Step 2	Vacuum Vent	Argon	0	1.38×10^5	>4.1	TBD	0.133	TBD	1.2×10^{-3}	
FO-4 Step 1	Vacuum Vent	Nitrogen	0	1.38×10^5	TBD	TBD	0.133	TBD	1.2×10^{-3}	
Step 2	Pressurize	Argon	0	1.38×10^5	>4.1	TBD	0.133	TBD	1.2×10^{-3}	
FO-5	N/A									
FO-6	N/A									
FO-6A	N/A									
FO-7	N/A									
FO-8	N/A									
FO-9	Vent		0				0.133	TBD	1.2×10^{-3}	
FO-11	N/A									

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2.7. DATA SYSTEM REQUIREMENTS

Furnace Module-1 will require the use of the Furnace Data Acquisition and Control System (FDACS) consisting of a Furnace Control Unit (FCU) and a Furnace Actuator Unit (FAU), which will monitor and collect data from Furnace Module-1 and provide control stimulus as needed for the positioning of samples. The requirements from the Furnace Module-1 to the SSFF Core are defined in subsections 2.7.1 through 2.7.5 and in Tables 2.7-1 through 2.7-5..

2.7.1 SIGNAL INTERFACE DEFINITION

Table 2.7-1 defines the following data signals and control to perform the following data handling and operations functions:

- Furnace Module-1 activation and control
- Acquisition, formatting, and routing of Furnace Module-1 housekeeping data
- Acquisition, formatting, and routing of Furnace Module-1 science data

2.7.2 SIGNAL INTERFACE DEFINITION EXPANSION

Table 2.7-2 is an expansion of the input and output data streams identified in Table 2.7-1.

2.7.3 EVENT/EXCEPTION MONITORING REQUIREMENTS

Onboard event and exception monitoring requirements for data transmitted to the SSFF are defined in Table 2.7-3.

2.7.4 PAYLOAD OPERATIONS INTEGRATION CENTER DISPLAY REQUIREMENTS

The Payload Operations Integration Center (POIC) controls all payload operations and is equipped with consoles for data management, operations control, and mission planning. The data to provide this capability are shown in Table 2.7-4.

2.7.5 POIC LIMIT SENSING/EXCEPTION MONITORING REQUIREMENTS

Limit sensing and exception monitoring are provided to the POIC via downlink and are defined in Table 2.7-5.

TABLE 2.7-1. SIGNAL INTERFACE DEFINITION

ENT NO.	DESCRIPTION	C M D U L K	S I G N A L	D I E N . F	I N O T . R	SER.DATA NM OS G	NW OO .G	S O O R	E V P	X P	A C	L M P	A A T E	RESERVED
106	FURNACE MODULE HOUSEKEEPING DATA		SI		1	3	32	N				1		
107	SSFF HOUSEKEEPING DATA		SI		1	3	32	N				1		
850	FURNACE SCIENCE DATA		SI		1	3	32	N				1		
851	FURNACE SCIENCE DATA		SI		1	3	32	N				1		

1 2 3 4 5 6 7 8
123 4567890123456789012345678901234 5 6789 012 34 56 7 8 9 0 1 234 567 890 123 4 567 890 1 23 4567 89 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 1 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START WD	START BT	END WD	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
200	106	Go/NoGo Error Override		DI		01		B	00	00	00	00					Y		3330	41	2
201	106	Process Elapsed Time - Seconds		DG		01	06	U	00	01	00	06					Y		3331	41	2
202	106	CGF Sytstem State		DG		01	03	U	00	07	00	09					Y		3332	41	2
203	106	Sample Number (Mode)		DG		01	06	U	00	10	00	15					Y		3333	41	2
204	106	Process Elapsed Time - Hours		DG		01	10	U	01	00	01	09					Y		3334	41	2
205	106	Process Elapsed Time - Minutes		DG		01	06	U	01	10	01	15					Y		3335	41	2
207	106	IFEA Water Outlet Temp		AI		01		S	03	00	03	07			Y	Y	Y		3336	41	2
208	106	IFEA Lower Humidity		AI		01		S	04	00	04	07			Y	Y	Y		3337	41	2
209	106	IFEA Upper Humidity		AI		01		S	05	00	05	07			Y	Y	Y		3338	41	2
210	106	IFEA Upper Atmosphere Temp		AI		01		S	12	00	12	07			Y	Y	Y		3355	41	2
211	106	RFM Cold End Shell Temp		AI		01		S	13	00	13	07			Y	Y	Y		3356	41	2
212	106	RFM Hot End Shell Temp		AI		01		S	14	00	14	07			Y	Y	Y		3357	41	2
213	106	Ampoule Alignment Arm Temp		AI		01		S	15	00	15	07					Y		3358	41	2
214	106	SEM Track Temp		AI		01		S	16	00	16	07					Y		3359	41	2
215	106	IFEA Absolute Pressure 1		AI		01		S	17	00	17	07			Y	Y	Y		3360	41	2
216	106	IFEA Absolute Pressure 2		AI		01		S	18	00	18	07			Y	Y	Y		3361	41	2
217	106	Furnace Linear Position		AI		01		S	19	00	19	07					Y		3362	41	2
218	106	Indexing CAM Rotary Position		AI		01		S	20	00	20	07					Y		3363	41	2
219	106	Experiment Main Bus Current		AI		01		S	21	00	21	07			Y	Y	Y		3364	41	2
220	106	Experiment Main Bus Voltage		AI		01		S	22	00	22	07			Y	Y	Y		3365	41	2
221	106	Water Outlet Vlv RCCB Off Status		DI		01		B	23	00	23	00					Y		3250	41	2
222	106	Water Outlet Vlv RCCB On Status		DI		01		B	23	01	23	01					Y		3251	41	2
223	106	IFEA Coolant Flow #1 Status		DI		01		B	23	02	23	02			Y		Y		3366	41	2
224	106	IFEA Coolant Flow #2 Status		DI		01		B	23	03	23	03			Y		Y		3367	41	2
225	106	Vacuum Vent Vlv RCCB Off Status		DI		01		B	23	04	23	04					Y		3368	41	2
226	106	Vacuum Vent Vlv RCCB On Status		DI		01		B	23	05	23	05					Y		3369	41	2
227	106	Hot Boost Mod A RCCB Off Status		DI		01		B	23	06	23	06					Y		3370	41	2
228	106	Hot Boost Mod A RCCB On Status		DI		01		B	23	07	23	07					Y		3371	41	2
229	106	Hot Boost Mod B RCCB Off Status		DI		01		B	23	08	23	08					Y		3372	41	2
230	106	Hot Boost Mod B RCCB On Status		DI		01		B	23	09	23	09					Y		3373	41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 2 of 38)

ENT NO.	CONN	DESCRIPTION	CMD	UNIT	MNSO.G.	NMOS/G	SOY/W/D/S/D	FIELD	START WD#	START BT#	END WD#	END BT#	DATA TYPE	DATA VALUE	MON REQ ENV NOT	CMD ACK LIM CMD	//////////	SID NO.	EXT DIO EDI	TAIL ADD DAT
231	106	COLD Main Prim Mod RCCB Off Stat	DI	01			B	23	10	23	10						Y	3374	41	2
232	106	COLD Main Prim Mod RCCB On Stat	DI	01			B	23	11	23	11						Y	3375	41	2
233	106	HotMain Prim Mod A RCCB Off Stat	DI	01			B	23	12	23	12						Y	3376	41	2
234	106	HotMain Prim Mod A RCCB On Stat	DI	01			B	23	13	23	13						Y	3377	41	2
235	106	Water Inlet Valve RCCB Off Stat	DI	01			B	23	14	23	14						Y	3378	41	2
236	106	Water Inlet Valve RCCB On Status	DI	01			B	23	15	23	15						Y	3379	41	2
237	106	PDS Airflow 1 Status	DI	01			B	24	00	24	00				Y		Y	3380	41	2
238	106	SCS Airflow 1 Status	DI	01			B	24	01	24	01				Y		Y	3381	41	2
239	106	PCS Airflow 1 Status	DI	01			B	24	02	24	02				Y		Y	3382	41	2
240	106	PCS Airflow 2 Status	DI	01			B	24	03	24	03				Y		Y	3383	41	2
241	106	Argon Fill Valve RCCB Off Status	DI	01			B	24	04	24	04						Y	3384	41	2
242	106	Argon Fill Valve RCCB On Status	DI	01			B	24	05	24	05						Y	3385	41	2
243	106	PCS Utility RCCB Off Status	DI	01			B	24	06	24	06						Y	3386	41	2
244	106	PCS Utility RCCB On Status	DI	01			B	24	07	24	07						Y	3387	41	2
245	106	Peltier Conn Motor RCCB Off Stat	DI	01			B	24	08	24	08						Y	3388	41	2
246	106	Peltier Conn Motor RCCB On Stat	DI	01			B	24	09	24	09						Y	3389	41	2
247	106	Cold Main Red Mod RCCB Off Stat	DI	01			B	24	10	24	10						Y	3390	41	2
248	106	Cold Main Red Mod RCCB On Status	DI	01			B	24	11	24	11						Y	3391	41	2
249	106	Hot Main Prim Mod B RCCB Off Sta	DI	01			B	24	12	24	12						Y	3392	41	2
250	106	Hot Main Prim Mod B RCCB On Stat	DI	01			B	24	13	24	13						Y	3393	41	2
251	106	Hot Guard Module RCCB Off Status	DI	01			B	24	14	24	14						Y	3394	41	2
252	106	Hot Guard Module RCCB On Status	DI	01			B	24	15	24	15						Y	3395	41	2
253	106	Mech Pulsing Mod RCCB Off Status	DI	01			B	25	00	25	00						Y	3252	41	2
254	106	Mech Pulsing Mod RCCB On Status	DI	01			B	25	01	25	01						Y	3253	41	2
255	106	IFEA ABS Press 2 RCCB Off Status	DI	01			B	25	02	25	02						Y	3396	41	2
256	106	IFEA ABS Press 2 RCCB On Status	DI	01			B	25	03	25	03						Y	3397	41	2
257	106	IFEA ABS Press 1 RCCB Off Status	DI	01			B	25	04	25	04						Y	3398	41	2
258	106	IFEA ABS Press 1 RCCB On Status	DI	01			B	25	05	25	05						Y	3399	41	2
259	106	Vacuum Vent Valve Closed Status	DI	01			B	25	06	25	06						Y	3400	41	2
260	106	Vacuum Vent Valve Open Status	DI	01			B	25	07	25	07						Y	3401	41	2

ENT NO.	CONN	DESCRIPTION	CMD	UNIT	MNSO.G.	NMOS/G	SOY/W/D/S/D	FIELD	START WD#	START BT#	END WD#	END BT#	DATA TYPE	DATA VALUE	MON REQ ENV NOT	CMD ACK LIM CMD	//////////	SID NO.	EXT DIO EDI	TAIL ADD DAT
0 3	0 6	0 7			3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 3 of 38)

ENT NO.	C O R . R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P I E	DATA DESCRIPTION START WD #	START BT #	END WD #	END BT #	DATA VALUE T Y P E	MON REQ E V N T	C A E X C P	L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
261	106	Argon Fill Valve Closed Status		DI	01			B	25	08	25	08						Y		3402	41	2
262	106	Argon Fill Valve Open Status		DI	01			B	25	09	25	09						Y		3403	41	2
263	106	Hot Main Red Mod A RCCB Off Stat		DI	01			B	25	10	25	10						Y		3254	41	2
264	106	Hot Main Red Mod A RCCB On Stat		DI	01			B	25	11	25	11						Y		3255	41	2
265	106	Water Outlet Valve Normal Stat		DI	01			B	25	12	25	12				Y				3404	41	2
266	106	Water Outlet Valve Bypass Stat		DI	01			B	25	13	25	13				Y				3405	41	2
267	106	Water Inlet Valve Normal Status		DI	01			B	25	14	25	14				Y				3406	41	2
268	106	Water Inlet Valve Bypass Status		DI	01			B	25	15	25	15				Y				3407	41	2
269	106	Fail Safe Brake RCCB Off Status		DI	01			B	26	00	26	00						Y		3408	41	2
270	106	Fail Safe Brake RCCB On Status		DI	01			B	26	01	26	01						Y		3409	41	2
271	106	Core Hold Down Not Retracted		DI	01			B	26	02	26	02						Y		3410	41	2
272	106	Core Hold Down Retracted		DI	01			B	26	03	26	03						Y		3411	41	2
273	106	Core Hold Down Not Extended		DI	01			B	26	04	26	04						Y		3412	41	2
274	106	Core Hold Down Extended		DI	01			B	26	05	26	05						Y		3413	41	2
275	106	Core HD Motor RCCB Off Status		DI	01			B	26	06	26	06						Y		3414	41	2
276	106	Core HD Motor RCCB On Status		DI	01			B	26	07	26	07						Y		3415	41	2
277	106	Step Motor Clutch RCCB Off Stat		DI	01			B	26	08	26	08						Y		3416	41	2
278	106	Step Motor Clutch RCCB On Status		DI	01			B	26	09	26	09						Y		3417	41	2
279	106	Step Motor Drive RCCB Off Stat		DI	01			B	26	10	26	10						Y		3418	41	2
280	106	Step Motor Drive RCCB On Stat		DI	01			B	26	11	26	11						Y		3419	41	2
281	106	Rapid Xlation Clutch RCCB Off St		DI	01			B	26	12	26	12						Y		3420	41	2
282	106	Rapid Xlation Clutch RCCB On St		DI	01			B	26	13	26	13						Y		3421	41	2
283	106	Rapid Xlation Mtr RCCB Off Stat		DI	01			B	26	14	26	14						Y		3422	41	2
284	106	Rapid Xlation Mtr RCCB On Status		DI	01			B	26	15	26	15						Y		3423	41	2
285	106	Furnace Position Not Home		DI	01			B	27	00	27	00						Y		3424	41	2
286	106	Furnace Position Home		DI	01			B	27	01	27	01						Y		3425	41	2
287	106	Furn Extreme Trvl Not Exceeded		DI	01			B	27	02	27	02				Y				3426	41	2
288	106	Furn Extreme Trvl Exceeded		DI	01			B	27	03	27	03				Y				3427	41	2
289	106	Ampoule Alignment Not Retracted		DI	01			B	27	04	27	04						Y		3428	41	2
290	106	Ampoule Alignment Retracted		DI	01			B	27	05	27	05						Y		3429	41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 4 of 38)

ENT NO.	CON.	DESCRIPTION	CUM DAG UEL K	MN SO G.	NM OS /G W D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT #	END WD #	END BT #	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . X C O P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
291	106	Ampoule Alignment Not Extended	DI	01	B	27	06	27	06					Y	3430	41	2
292	106	Ampoule Alignment Extended	DI	01	B	27	07	27	07					Y	3431	41	2
293	106	Ampoule Align Mtr RCCB Off Stat	DI	01	B	27	08	27	08					Y	3432	41	2
294	106	Ampoule Align Mtr RCCB On Stat	DI	01	B	27	09	27	09					Y	3433	41	2
295	106	Ampoule Support Not Retracted	DI	01	B	27	10	27	10					Y	3434	41	2
296	106	Ampoule Support Retracted	DI	01	B	27	11	27	11					Y	3435	41	2
297	106	Ampoule Support Not Secure	DI	01	B	27	12	27	12					Y	3436	41	2
298	106	Ampoule Support Secure	DI	01	B	27	13	27	13					Y	3437	41	2
299	106	Ampoule Spt Plt Mtr RCCB Off St	DI	01	B	27	14	27	14					Y	3438	41	2
300	106	Ampoule Spt Plt Mtr RCCB On Stat	DI	01	B	27	15	27	15					Y	3439	41	2
301	106	Cold Guard Mod RCCB Off Status	DI	01	B	28	00	28	00					Y	3256	41	2
302	106	Cold Guard Mod RCCB On Status	DI	01	B	28	01	28	01					Y	3257	41	2
303	106	Carousel Spacer Plt Gap Lim-Not	DI	01	B	28	02	28	02					Y	3440	41	2
304	106	Carousel Spacer Plt Gap Limit	DI	01	B	28	03	28	03					Y	3441	41	2
305	106	Indexing Cam Not Stowed	DI	01	B	28	04	28	04					Y	3442	41	2
306	106	Indexing Cam Stowed	DI	01	B	28	05	28	05					Y	3443	41	2
307	106	Carousel Trk Extr Left Lim-Not	DI	01	B	28	06	28	06					Y	3444	41	2
308	106	Carousel Trk Extr Left Limit	DI	01	B	28	07	28	07					Y	3445	41	2
309	106	Carousel Trk Extr Right Lim-Not	DI	01	B	28	08	28	08					Y	3446	41	2
310	106	Carousel Trk Extr Right Lim	DI	01	B	28	09	28	09					Y	3447	41	2
311	106	Hot Main Red Mod B RCCB Off Stat	DI	01	B	28	10	28	10					Y	3258	41	2
312	106	Hot Main Red Mod B RCCB On Stat	DI	01	B	28	11	28	11					Y	3259	41	2
313	106	SEM Index Motor RCCB Off Status	DI	01	B	28	12	28	12					Y	3448	41	2
314	106	SEM Index Motor RCCB On Status	DI	01	B	28	13	28	13					Y	3449	41	2
315	106	SEM Indexing Jog CCW Status	DI	01	B	28	14	28	14					Y	3450	41	2
316	106	SEM Indexing Jog CW Status	DI	01	B	28	15	28	15					Y	3451	41	2
317	106	Ampoule Not Processing	DI	01	B	29	00	29	00					Y	3452	41	2
318	106	Ampoule Processing	DI	01	B	29	01	29	01					Y	3453	41	2
319	106	System Bus Relay Off Status	DI	01	B	29	02	29	02					Y	3454	41	2
320	106	System Bus Relay On Status	DI	01	B	29	03	29	03					Y	3455	41	2

ENT NO.	CON.	DESCRIPTION	CUM DAG UEL K	MN SO G.	NM OS /G W D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT #	END WD #	END BT #	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . X C O P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
0 3	0 0 6 7			3 4 9 0	4 4 3 5	4 4 7 8		5 5 1 3	5 5 5 7			6 6 6 5 6 7		7 7 1 2	7 7 5 8		8 0		

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 5 of 38)

ENT NO.	C O R . R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START #	START BT	END #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A E X C O T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
321	106		Peltier Pulsing Drv RCCB Off St		DI	01			B	29	04	29	04					Y		3260	41	2
322	106		Peltier Pulsing Drv RCCB On Stat		DI	01			B	29	05	29	05					Y		3261	41	2
001	850		Sync			02															41	2
002	850		Frame Count (SFID)			02															41	2
003	850		Spacelab Experiment ID			02															41	2
004	850		Sample Number (Mode)			02															41	2
005	850		Mission ID			02															41	2
006	850		Furnace Position Not Home			02															41	2
007	850		Furnace Position Home			02															41	2
008	850		Furn Extreme Trvl Not Exceeded			02															41	2
009	850		Furn Extreme Trvl Exceeded			02															41	2
010	850		Core Hold Down Not Retracted			02															41	2
011	850		Core Hold Down Retracted			02															41	2
012	850		Core Hold Down Not Extended			02															41	2
013	850		Core Hold Down Extended			02															41	2
014	850		Water Outlet Valve Normal Stat			02															41	2
015	850		Water Outlet Valve Bypass Stat			02															41	2
016	850		Water Inlet Valve Normal Status			02															41	2
017	850		Water Inlet Valve Bypass Status			02															41	2
018	850		Vacuum Vent Valve Open Status			02															41	2
019	850		Vacuum Vent Valve Closed Status			02															41	2
020	850		Argon Fill Valve Open Status			02															41	2
021	850		Argon Fill Valve Closed Status			02															41	2
022	850		Ampoule Support Not Retracted			02															41	2
023	850		Ampoule Support Retracted			02															41	2
024	850		Ampoule Alignment Not Retracted			02															41	2
025	850		Ampoule Alignment Retracted			02															41	2
026	850		Ampoule Alignment Not Extended			02															41	2
027	850		Ampoule Alignment Extended			02															41	2
028	850		SEM Indexing Jog CCW Status			02															41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 6 of 38)

ENT NO.	CON	DESCRIPTION	CMD	USAGE	MNSOG.	NMOS/G	SOI/S	TYP	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY	DATA VALUE P	DATA VALUE E	MON REQ ---VEN T	CAL EXC PRO	CAL ---- COD	RCIO DE	SID NO.	EXP PID	TAB BIL
029	850	SEM Indexing Jog CW Status			02																41	2
030	850	Ampoule Not Processing			02																41	2
031	850	Ampoule Processing			02																41	2
032	850	Indexing Cam Not Stowed			02																41	2
033	850	Indexing Cam Stowed			02																41	2
034	850	Peltier Connector Not Retracted			02																41	2
035	850	Peltier Connector Retracted			02																41	2
036	850	Peltier Connector Not Extended			02																41	2
037	850	Peltier Connector Extended			02																41	2
038	850	Ampoule 4 Failure 2 Status			02																41	2
039	850	Ampoule 4 Failure 1 Status			02																41	2
040	850	Ampoule 3 Failure 2 Status			02																41	2
041	850	Ampoule 3 Failure 1 Status			02																41	2
042	850	Ampoule 2 Failure 2 Status			02																41	2
043	850	Ampoule 2 Failure 1 Status			02																41	2
044	850	Ampoule 1 Failure 2 Status			02																41	2
045	850	Ampoule 1 Failure 1 Status			02																41	2
046	850	PDS Airflow 1 Status			02																41	2
047	850	PCS Airflow 1 Status			02																41	2
048	850	IFEA ABS Press 2 RCCB Off Status			02																41	2
049	850	IFEA ABS Press 2 RCCB On Status			02																41	2
050	850	Spare RCCB Off Stat			02																41	2
051	850	Spare RCCB On Stat			02																41	2
052	850	IFEA Coolant Flow #1 Status			02																41	2
053	850	SCS Airflow 1 Status			02																41	2
054	850	Cartridge 2 Failure 2 Status			02																41	2
055	850	Cartridge 2 Failure 1 Status			02																41	2
056	850	Cartridge 1 Failure 2 Status			02																41	2
057	850	Cartridge 1 Failure 1 Status			02																41	2
058	850	Ampoule 6 Failure 2 Status			02																41	2
03	067		34 90		44 35	47	48		51	53	55	57				665	667	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 7 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
059	850		Ampoule 6 Failure 1 Status			02														41	2
060	850		Ampoule 5 Failure 2 Status			02														41	2
061	850		Ampoule 5 Failure 1 Status			02														41	2
062	850		Water Outlet Vlv RCCB Off Status			02														41	2
063	850		Water Outlet Vlv RCCB On Status			02														41	2
064	850		Vacuum Vent Vlv RCCB Off Status			02														41	2
065	850		Vacuum Vent Vlv RCCB On Status			02														41	2
066	850		SEM Index Motor RCCB Off Status			02														41	2
067	850		SEM Index Motor RCCB On Status			02														41	2
068	850		Core HD Motor RCCB Off Status			02														41	2
069	850		Core HD Motor RCCB On Status			02														41	2
070	850		Hot Boost Mod A RCCB Off Status			02														41	2
071	850		Hot Boost Mod A RCCB On Status			02														41	2
072	850		Hot Boost Mod B RCCB Off Status			02														41	2
073	850		Hot Boost Mod B RCCB On Status			02														41	2
074	850		Cold Main Prim Mod RCCB Off Stat			02														41	2
075	850		Cold Main Prim Mod RCCB On Stat			02														41	2
076	850		HotMain Prim Mod A RCCB Off Stat			02														41	2
077	850		HotMain Prim Mod A RCCB On Stat			02														41	2
078	850		Carousel Trk Extr Right Lim-Not			02														41	2
079	850		Carousel Trk Extr Right Lim			02														41	2
080	850		Ampoule Support Not Secure			02														41	2
081	850		Ampoule Support Secure			02														41	2
082	850		Carousel Trk Extr Left Lim-Not			02														41	2
083	850		Carousel Trk Extr Left Limit			02														41	2
084	850		Carousel Spacer Plt Gap Lim-Not			02														41	2
085	850		Carousel Spacer Plt Gap Limit			02														41	2
086	850		Ampoule Spt Plt Mtr RCCB Off St			02														41	2
087	850		Ampoule Spt Plt Mtr RCCB On Stat			02														41	2
088	850		Ampoule Align Mtr RCCB Off Stat			02														41	2
030	006	07		34		43	45	47	48	51	53	55	57		656	657	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 8 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
089	850		Ampoule Align Mtr RCCB On Stat			02														41	2
090	850		Water Inlet Valve RCCB Off Stat			02														41	2
091	850		Water Inlet Valve RCCB On Status			02														41	2
092	850		Argon Fill Valve RCCB Off Status			02														41	2
093	850		Argon Fill Valve RCCB On Status			02														41	2
094	850		System Bus Relay Off Status			02														41	2
095	850		System Bus Relay On Status			02														41	2
096	850		IFEA Coolant Flow #2 Status			02														41	2
097	850		PCS Airflow 2 Status			02														41	2
098	850		Cartridge 6 Failure 2 Status			02														41	2
099	850		Cartridge 6 Failure 1 Status			02														41	2
100	850		Cartridge 5 Failure 2 Status			02														41	2
101	850		Cartridge 5 Failure 1 Status			02														41	2
102	850		Cartridge 4 Failure 2 Status			02														41	2
103	850		Cartridge 4 Failure 1 Status			02														41	2
104	850		Cartridge 3 Failure 2 Status			02														41	2
105	850		Cartridge 3 Failure 1 Status			02														41	2
106	850		PCS Utility RCCB Off Status			02														41	2
107	850		PCS Utility RCCB On Status			02														41	2
108	850		Step Motor Drive RCCB Off Stat			02														41	2
109	850		Step Motor Drive RCCB On Stat			02														41	2
110	850		IFEA ABS Press 1 RCCB Off Status			02														41	2
111	850		IFEA ABS Press 1 RCCB On Status			02														41	2
112	850		Peltier Conn Motor RCCB Off Stat			02														41	2
113	850		Peltier Conn Motor RCCB On Stat			02														41	2
114	850		Step Motor Clutch RCCB Off Stat			02														41	2
115	850		Step Motor Clutch RCCB On Status			02														41	2
116	850		Rapid Xlation Clutch RCCB Off St			02														41	2
117	850		Rapid Xlation Clutch RCCB On St			02														41	2
118	850		Rapid Xlation Mtr RCCB Off Stat			02														41	2
003	067	000		39	40	043	045	047	048	051	053	055	057	065	066	067	071	072	075	078	080

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 9 of 38)

ENT NO.	C O R .	O O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I D	T P E X	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L E X C P	C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
119	850		Rapid Xlation Mtr RCCB On Status			02															41	2
120	850		Fail Safe Brake RCCB Off Status			02															41	2
121	850		Fail Safe Brake RCCB On Status			02															41	2
122	850		Cold Main Red Mod RCCB Off Stat			02															41	2
123	850		Cold Main Red Mod RCCB On Status			02															41	2
124	850		Hot Main Prim Mod B RCCB Off Sta			02															41	2
125	850		Hot Main Prim Mod B RCCB On Stat			02															41	2
126	850		Hot Guard Module RCCB Off Status			02															41	2
127	850		Hot Guard Module RCCB On Status			02															41	2
128	850		Mech Pulsing Mod RCCB Off Status			02															41	2
129	850		Mech Pulsing Mod RCCB On Status			02															41	2
130	850		Hot Main Red Mod A RCCB Off Stat			02															41	2
131	850		Hot Main Red Mod A RCCB On Stat			02															41	2
132	850		Cold Guard Mod RCCB Off Status			02															41	2
133	850		Cold Guard Mod RCCB On Status			02															41	2
134	850		Hot Main Red Mod B RCCB Off Stat			02															41	2
135	850		Hot Main Red Mod B RCCB On Stat			02															41	2
136	850		Peltier Pulsing Drv RCCB Off St			02															41	2
137	850		Peltier Pulsing Drv RCCB On Stat			02															41	2
138	850		Sample to Process #1			02															41	2
139	850		Sample to Process #2			02															41	2
140	850		Sample to Process #3			02															41	2
141	850		Sample to Process #4			02															41	2
142	850		Sample to Process #5			02															41	2
143	S850		ample to Process #6			02															41	2
144	850		Processed Sample #1			02															41	2
145	850		Processed Sample #2			02															41	2
146	850		Processed Sample #3			02															41	2
147	850		Processed Sample #4			02															41	2
148	850		Processed Sample #5			02															41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0	

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 10 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C P	C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
149	850		Processed Sample #6			02															41	2
150	850		Last Sample Index			02															41	2
151	850		GMT Day			02															41	2
152	850		GMT Milliseconds of Day			02															41	2
153	850		GMT Fractional Milliseconds			02															41	2
154	850		Last Command Received Word #0			02															41	2
155	850		Last Command Received Word #1			02															41	2
156	850		Last Command Received Word #2			02															41	2
157	850		Last Command Received Word #3			02															41	2
158	850		Last Command Received Word #4			02															41	2
159	850		Last Command Received Word #5			02															41	2
160	850		Last Command Received Word #6			02															41	2
161	850		Last Command Received Word #7			02															41	2
162	850		Last Command Received Word #8			02															41	2
163	850		Last Command Received Word #9			02															41	2
164	850		Last Command Received Word #10			02															41	2
165	850		Last Command Received Word #11			02															41	2
166	850		Last Command Received Word #12			02															41	2
167	850		Last Command Received Word #13			02															41	2
168	850		Last Command Received Word #14			02															41	2
169	850		Last Command Received Word #15			02															41	2
170	850		Last Command Received Word #16			02															41	2
171	850		Last Command Received Word #17			02															41	2
172	850		Last Command Received Word #18			02															41	2
173	850		Last Command Received Word #19			02															41	2
174	850		Last Command Received Word #20			02															41	2
175	850		Last Command Received Word #21			02															41	2
176	850		Last Command Received Word #22			02															41	2
177	850		Last Command Received Word #23			02															41	2
178	850		Last Command Received Word #24			02															41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0	

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 11 of 38)

ENT NO.	CON	DESCRIPTION	CMD	USAGE	MNG.	NM SO/G	OS /W/D/S	SIG /F/I/X/D	TYP /E/P	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA TYPE	DATA VALUE	MON REQ ---VEN	CAL EXC CON	////////////// CMD?	RCV IO D E	SID NO.	EXP PAR IND	TAR ABL LEN
179	850	Last Command Received Word #25			02																41	2
180	850	Last Command Received Word #26			02																41	2
181	850	Last Command Received Word #27			02																41	2
182	850	Last Command Received Word #28			02																41	2
183	850	Last Command Received Word #29			02																41	2
184	850	Last Command Received Word #30			02																41	2
185	850	Last Command Received Word #31			02																41	2
186	850	Invalid Command Flag			02																41	2
187	850	User Requested Data			02																41	2
188	850	ECS Next Timeline Record			02																41	2
189	850	FTS Next Timeline Record			02																41	2
190	850	FHS Cold Guard Next Timeline Rec			02																41	2
191	850	FHS Cold Zone Next Timeline Rec			02																41	2
192	850	FHS Booster Next Timeline Rec			02																41	2
193	850	FHS Hot Zone Next Timeline Rec			02																41	2
194	850	FHS Hot Guard Next Timeline Rec			02																41	2
195	850	SIDS Next Timeline Record			02																41	2
196	850	ECS Current Segment Start Time			02																41	2
197	850	ECS Current Segment Stop Time			02																41	2
198	850	FTS Current Segment Start Time			02																41	2
199	850	FTS Current Segment Stop Time			02																41	2
200	850	FHS Cold Guard Cur Seg Start Tim			02																41	2
201	850	FHS Cold Guard Cur Seg Stop Time			02																41	2
202	850	FHS Cold Zone Cur Seg Start Time			02																41	2
203	850	FHS Cold Zone Cur Seg Stop Time			02																41	2
204	850	FHS Booster Cur Seg Start Time			02																41	2
205	850	FHS Booster Cur Seg Stop Time			02																41	2
206	850	FHS Hot Zone Cur Seg Start Time			02																41	2
207	850	FHS Hot Zone Cur Seg Stop Time			02																41	2
208	850	FHS Hot Guard Cur Seg Start Time			02																41	2
0 3	0 6	0 7			3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 12 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G	S O W D S /	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TY P E	MON REQ --- E N T	C A L . C O P	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
209	850	FHS Hot Guard Cur Seg Stop Time			02														41	2
210	850	SIDS Current Segment Start Time			02														41	2
211	850	SIDS Current Segment Stop Time			02														41	2
212	850	Experiment Main Bus Current			02														41	2
213	850	Experiment Main Bus Voltage			02														41	2
214	850	IFEA Lower Humidity			02														41	2
215	850	IFEA Upper Humidity			02														41	2
216	850	IFEA Absolute Pressure 1			02														41	2
217	850	IFEA Absolute Pressure 2			02														41	2
218	850	IFEA Lower Atmosphere Temp			02														41	2
219	850	IFEA Upper Atmosphere Temp			02														41	2
220	850	IFEA Water Inlet Temp			02														41	2
221	850	IFEA Water Outlet Temp			02														41	2
222	850	RFM Cold End Shell Temp			02														41	2
223	850	RFM Hot End Shell Temp			02														41	2
224	850	RFM Water Outlet Temp			02														41	2
225	850	Sample 1 Temp 1			02														41	2
226	850	Sample 1 Temp 2			02														41	2
227	850	Sample 1 Temp 3			02														41	2
228	850	Sample 1 Temp 4			02														41	2
229	850	Sample 1 Temp 5			02														41	2
230	850	Sample 1 Temp 6			02														41	2
231	850	Sample 2 Temp 1			02														41	2
232	850	Sample 2 Temp 2			02														41	2
233	850	Sample 2 Temp 3			02														41	2
234	850	Sample 2 Temp 4			02														41	2
235	850	Sample 2 Temp 5			02														41	2
236	850	Sample 2 Temp 6			02														41	2
237	850	Sample 3 Temp 1			02														41	2
238	850	Sample 3 Temp 2			02														41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 13 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
239	850		Sample 3 Temp 3			02														41	2
240	850		Sample 3 Temp 4			02														41	2
241	850		Sample 3 Temp 5			02														41	2
242	850		Sample 3 Temp 6			02														41	2
243	850		Sample 4 Temp 1			02														41	2
244	850		Sample 4 Temp 2			02														41	2
245	850		Sample 4 Temp 3			02														41	2
246	850		Sample 4 Temp 4			02														41	2
247	850		Sample 4 Temp 5			02														41	2
248	850		Sample 4 Temp 6			02														41	2
249	850		Sample 5 Temp 1			02														41	2
250	850		Sample 5 Temp 2			02														41	2
251	850		Sample 5 Temp 3			02														41	2
252	850		Sample 5 Temp 4			02														41	2
253	850		Sample 5 Temp 5			02														41	2
254	850		Sample 5 Temp 6			02														41	2
255	850		Sample 6 Temp 1			02														41	2
256	850		Sample 6 Temp 2			02														41	2
257	850		Sample 6 Temp 3			02														41	2
258	850		Sample 6 Temp 4			02														41	2
259	850		Sample 6 Temp 5			02														41	2
260	850		Sample 6 Temp 6			02														41	2
261	850		Stepping Motor Phase A Current			02														41	2
262	850		Stepping Motor Phase A Voltage			02														41	2
263	850		Stepping Motor Phase B Current			02														41	2
264	850		Stepping Motor Phase B Voltage			02														41	2
265	850		Furnace Linear Position			02														41	2
266	850		FTS Stepping Motor Temp			02														41	2
267	850		Rapid Translation Motor RPM			02														41	2
268	850		Cold Guard Heater Current			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 14 of 38)

ENT NO.	CON NO.	DESCRIPTION	CMD	USAGE	MSG.	MSG/SIG	NMOS	SOF	TOP	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TYP	MON REQ ENV	CAL EXC NOT	CAL OFF PRO	////////// CAL DAT ??	RCIO DE	SID NO.	EXP PID DID	TAB ABL ELE
269	850	Cold Guard Heater Voltage			02																41	2
270	850	Cold Main Primary Heater Current			02																41	2
271	850	Cold Main Primary Heater Voltage			02																41	2
272	850	Cold Main Red Heater Current			02																41	2
273	850	Cold Main Red Heater Voltage			02																41	2
274	850	Hot Boost Heater Current			02																41	2
275	850	Hot Boost Heater Voltage			02																41	2
276	850	Hot Guard Heater Current			02																41	2
277	850	Hot Guard Heater Voltage			02																41	2
278	850	Hot Main Primary Heater Current			02																41	2
279	850	Hot Main Primary Heater Voltage			02																41	2
280	850	Hot Main Red Heater Current			02																41	2
281	850	Hot Main Red Heater Voltage			02																41	2
282	850	Cold Zone CJ Block Temp 1			02																41	2
283	850	Cold Zone CJ Block Temp 2			02																41	2
284	850	Hot Zone CJ Block Temp 1			02																41	2
285	850	Hot Zone CJ Block Temp 2			02																41	2
286	850	Sample 1 CJ Block Temp 1			02																41	2
287	850	Sample 1 CJ Block Temp 2			02																41	2
288	850	Sample 2 CJ Block Temp 1			02																41	2
289	850	Sample 2 CJ Block Temp 2			02																41	2
290	850	Sample 3 CJ Block Temp 1			02																41	2
291	850	Sample 3 CJ Block Temp 2			02																41	2
292	850	Sample 4 CJ Block Temp 1			02																41	2
293	850	Sample 4 CJ Block Temp 2			02																41	2
294	850	Sample 5 CJ Block Temp 1			02																41	2
295	850	Sample 5 CJ Block Temp 2			02																41	2
296	850	Sample 6 CJ Block Temp 1			02																41	2
297	850	Sample 6 CJ Block Temp 2			02																41	2
298	850	Booster Heater Control Temp 1			02																41	2

03	067	34 90	44 35	47 48	51	53	55	57	65 66 67	71 72	75 78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 15 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L E X C P	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
299	850	Booster Heater Control Temp 2				02															41	2
300	850	Cold Guard Heater Control Temp 1				02															41	2
301	850	Cold Guard Heater Control Temp 2				02															41	2
302	850	Cold Main Prim Htr Cntrl Temp 1				02															41	2
303	850	Cold Main Prim Htr Cntrl Temp 2				02															41	2
304	850	Cold Main Red Htr Control Temp 1				02															41	2
305	850	Cold Main Red Htr Control Temp 2				02															41	2
306	850	Hot Guard Heater Control Temp 1				02															41	2
307	850	Hot Guard Heater Control Temp 2				02															41	2
308	850	Hot Main Prim Htr Control Temp 1				02															41	2
309	850	Hot Main Prim Htr Control Temp 2				02															41	2
310	850	Hot Main Red Htr Control Temp 1				02															41	2
311	850	Hot Main Red Htr Control Temp 2				02															41	2
312	850	Indexing CAM Rotary Position				02															41	2
313	850	Ampoule Alignment Arm Temp				02															41	2
314	850	SEM Track Temp				02															41	2
315	850	RTD Mux 1 Calibration - High				02															41	2
316	850	RTD Mux 1 Calibration - Low				02															41	2
317	850	RTD Mux 2 Calibration - High				02															41	2
318	850	RTD Mux 2 Calibration - Low				02															41	2
319	850	RTD Mux 3 Calibration - High				02															41	2
320	850	RTD Mux 3 Calibration - Low				02															41	2
321	850	RTD Mux 4 Calibration - High				02															41	2
322	850	RTD Mux 4 Calibration - Low				02															41	2
323	850	RTD Mux 5 Calibration - High				02															41	2
324	850	RTD Mux 5 Calibration - Low				02															41	2
325	850	RTD Mux 6 Calibration - High				02															41	2
326	850	RTD Mux 6 Calibration - Low				02															41	2
327	850	RTD Mux 7 Calibration - High				02															41	2
328	850	RTD Mux 7 Calibration - Low				02															41	2

0	0	0	3	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 16 of 38)

ENT NO.	C O R . R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
329	850		RTD Mux 8 Calibration - High			02														41	2
330	850		RTD Mux 8 Calibration - Low			02														41	2
331	850		TC Group A Calibration Type K			02														41	2
332	850		TC Group A Calibration Type S			02														41	2
333	850		TC Group A Calibration Type B			02														41	2
334	850		TC Group B Calibration Type K			02														41	2
335	850		TC Group B Calibration Type S			02														41	2
336	850		TC Group B Calibration Type B			02														41	2
337	850		TC Group C Calibration Type K			02														41	2
338	850		TC Group C Calibration Type S			02														41	2
339	850		TC Group C Calibration Type B			02														41	2
340	850		TC Group D Calibration Type K			02														41	2
341	850		TC Group D Calibration Type S			02														41	2
342	850		TC Group D Calibration Type B			02														41	2
343	850		SMS Board Velocity Reading			02														41	2
344	850		Cold Guard Zone CJ Blck Act Temp			02														41	2
345	850		Cold Main CJ Block Act Temp			02														41	2
346	850		Booster Zone CJ Block Act Temp			02														41	2
347	850		Hot Main Zone CJ Block Act Temp			02														41	2
348	850		Hot Guard Zone CJ Block Act Temp			02														41	2
349	850		Total Calculated Power			02														41	2
350	850		Cold Guard Htr Cmd Current			02														41	2
351	850		Unused			02														41	2
352	850		Cold Main Prim Htr Cmd Current			02														41	2
353	850		Cold Main Red Htr Cmd Current			02														41	2
354	850		Booster Htr Cmd Current			02														41	2
355	850		Unused			02														41	2
356	850		Hot Main Prim Htr Cmd Current			02														41	2
357	850		Hot Main Red Htr Cmd Current			02														41	2
358	850		Hot Guard Htr Cmd Current			02														41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 17 of 38)

ENT NO.	CNO R.	DESCRIPTION	CU MS DA GE UL K	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TY P E	MON REQ --- EVX NCT	C A L . C O F	////////////// C DT ?	RC IO D E	SID NO.	E X P I D	T A B L E
359	850	Unused		02														41	2
360	850	Cold Guard Zone Setpoint Temp		02														41	2
361	850	Cold Main Zone Setpoint Temp		02														41	2
362	850	Booster Zone Setpoint Temp		02														41	2
363	850	Hot Main Zone Setpoint Temp		02														41	2
364	850	Hot Guard Zone Setpoint Temp		02														41	2
365	850	Cold Guard Htr Calc Temp 1		02														41	2
366	850	Cold Guard Htr Calc Temp 2		02														41	2
367	850	Unused		02														41	2
368	850	Unused		02														41	2
369	850	Cold Main Prim Htr Calc Temp 1		02														41	2
370	850	Cold Main Prim Htr Calc Temp 2		02														41	2
371	850	Cold Main Red Htr Calc Temp 1		02														41	2
372	850	Cold Main Red Htr Calc Temp 2		02														41	2
373	850	Booster Htr Calc Temp 1		02														41	2
374	850	Booster Htr Calc Temp 2		02														41	2
375	850	Unused		02														41	2
376	850	Unused		02														41	2
377	850	Hot Main Prim Htr Calc Temp 1		02														41	2
378	850	Hot Main Prim Htr Calc Temp 2		02														41	2
379	850	Hot Main Red Htr Calc Temp 1		02														41	2
380	850	Hot Main Red Htr Calc Temp 2		02														41	2
381	850	Hot Guard Htr Calc Temp 1		02														41	2
382	850	Hot Guard Htr Calc Temp 2		02														41	2
383	850	Unused		02														41	2
384	850	Unused		02														41	2
385	850	Cold Guard Zone Act Temp		02														41	2
386	850	Cold Main Zone Act Temp		02														41	2
387	850	Booster Zone Act Temp		02														41	2
388	850	Hot Main Zone Act Temp		02														41	2
003	067			39	40 43	45	78		51		53	55	57	65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 18 of 38)

ENT NO.	C O R . R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E N T	C A L . C O F	////////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
389	850		Hot Guard Zone Act Temp			02														41	2
390	850		Cold Guard Zone Delta Temp			02														41	2
391	850		Cold Main Zone Delta Temp			02														41	2
392	850		Booster Zone Delta Temp			02														41	2
393	850		Hot Main Zone Delta Temp			02														41	2
394	850		Hot Guard Zone Delta Temp			02														41	2
395	850		Cold Guard Zone Uncpld Power			02														41	2
396	850		Cold Main Zone Uncpld Power			02														41	2
397	850		Booster Zone Uncpld Power			02														41	2
398	850		Hot Main Zone Uncpld Power			02														41	2
399	850		Hot Guard Zone Uncpld Power			02														41	2
400	850		Cold Guard Zone Prop Power			02														41	2
401	850		Cold Main Zone Prop Power			02														41	2
402	850		Booster Zone Prop Power			02														41	2
403	850		Hot Main Zone Prop Power			02														41	2
404	850		Hot Guard Zone Prop Power			02														41	2
405	850		Cold Guard Zone Int Power			02														41	2
406	850		Cold Main Zone Int Power			02														41	2
407	850		Booster Zone Int Power			02														41	2
408	850		Hot Main Zone Int Power			02														41	2
409	850		Hot Guard Zone Int Power			02														41	2
410	850		Cold Guard Zone Power			02														41	2
411	850		Cold Main Zone Power			02														41	2
412	850		Booster Zone Power			02														41	2
413	850		Hot Main Zone Power			02														41	2
414	850		Hot Guard Zone Power			02														41	2
415	850		Cold Guard Htr Calc Voltage			02														41	2
416	850		Unused			02														41	2
417	850		Cold Main Prim Htr Calc Voltage			02														41	2
418	850		Cold Main Red Htr Calc Voltage			02														41	2
03	067	00		34	40	43	45	47	48	51	53	55	57	65	666	71	72	75	78	80	

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 19 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
419	850		Booster Htr Calc Voltage			02														41	2
420	850		Unused			02														41	2
421	850		Hot Main Prim Htr Calc Voltage			02														41	2
422	850		Hot Main Red Htr Calc Voltage			02														41	2
423	850		Hot Guard Htr Calc Voltage			02														41	2
424	850		Unused			02														41	2
425	850		Cold Guard Htr Act Current			02														41	2
426	850		Unused			02														41	2
427	850		Cold Main Prim Htr Act Current			02														41	2
428	850		Cold Main Red Htr Act Current			02														41	2
429	850		Booster Htr Act Current			02														41	2
430	850		Unused			02														41	2
431	850		Hot Main Prim Htr Act Current			02														41	2
432	850		Hot Main Red Htr Act Current			02														41	2
433	850		Hot Guard Htr Act Current			02														41	2
434	850		Unused			02														41	2
435	850		Cold Guard Htr Calc Resistance			02														41	2
436	850		Unused			02														41	2
437	850		ColdMain Prim Htr Calc Resistnce			02														41	2
438	850		ColdMain Red Htr Calc Resistance			02														41	2
439	850		Booster Htr Resistance			02														41	2
440	850		Unused			02														41	2
441	850		HOTMain Prim Htr Calc Resistance			02														41	2
442	850		Hot Main Red Htr Calc Resistance			02														41	2
443	850		Hot Guard Htr Calc Resistance			02														41	2
444	850		Unused			02														41	2
445	850		Cold Guard Htr Limited Power			02														41	2
446	850		Unused			02														41	2
447	850		Cold Main Prim Htr Limited Power			02														41	2
448	850		Cold Main Red Htr Limited Power			02														41	2

0	0	0		3	4	4	4	4	4	5	5	5	5	6	6	6		7	7	7	7	8
3	6	7		9	0	3	5	7	8	1	3	5	7	5	6	7	.	1	2	5	8	0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 20 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L	U S A G E K	MN SO G.	NM OS /G W D S /	S O F X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TY P E	MON REQ E N T	C A L E V C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
449	850		Booster Htr Limited Power			02														41	2
450	850		Unused			02														41	2
451	850		Hot Main Prim Htr Limited Power			02														41	2
452	850		Hot Main Red Htr Limited Power			02														41	2
453	850		Hot Guard Htr Limited Power			02														41	2
454	850		Unused			02														41	2
455	850		Cold Guard Htr Des Current			02														41	2
456	850		Unused			02														41	2
457	850		Cold Main Prim Htr Des Current			02														41	2
458	850		Cold Main Red Htr Des Current			02														41	2
459	850		Booster Htr Des Current			02														41	2
460	850		Unused			02														41	2
461	850		Hot Main Prim Htr Des Current			02														41	2
462	850		Hot Main Red Htr Des Current			02														41	2
463	850		Hot Guard Htr Des Current			02														41	2
464	850		Unused			02														41	2
465	850		Cold Guard Zone Saturation Flag			02														41	2
466	850		Cold Main Zone Saturation Flag			02														41	2
467	850		Booster Zone Saturation Flag			02														41	2
468	850		Hot Main Zone Saturation Flag			02														41	2
469	850		Hot Guard Zone Saturation Flag			02														41	2
470	850		Integral Power Fault Time			02														41	2
471	850		Fault Sum Delta Power			02														41	2
472	850		Fault Integral Gain			02														41	2
473	850		Fault Proportional Gain			02														41	2
474	850		Fault Intermediate Calc. Value 1			02														41	2
475	850		Fault Intermediate Calc. Value 2			02														41	2
476	850		Fault Delta Power - Previous			02														41	2
477	850		Fault Delta Power - 2nd Previous			02														41	2
478	850		Faulted Zone			02														41	2

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 21 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
479	850		Integral Gain Array 1			02															41 2
480	850		Integral Gain Array 2			02															41 2
481	850		Integral Gain Array 3			02															41 2
482	850		Integral Gain Array 4			02															41 2
483	850		Integral Gain Array 5			02															41 2
484	850		Proportional Gain Array 1			02															41 2
485	850		Proportional Gain Array 2			02															41 2
486	850		Proportional Gain Array 3			02															41 2
487	850		Proportional Gain Array 4			02															41 2
488	850		Proportional Gain Array 5			02															41 2
489	850	FF	Ampoule Align Not Extended			02															41 2
490	850	FF	Ampoule Align Extended			02															41 2
491	850	FF	Ampoule Align Mtr RCCB Off			02															41 2
492	850	FF	Ampoule Align Mtr RCCB On			02															41 2
493	850	FF	Car Trk Extr Right Lim-Not			02															41 2
494	850	FF	Car Trk Extr Right Lim			02															41 2
495	850	FF	Car Trk Extr Left Limit-Not			02															41 2
496	850	FF	Car Trk Extr Left Limit			02															41 2
497	850	FF	Car Spacer Plt Gap Lim-Not			02															41 2
498	850	FF	Car Spacer Plt Gap Lim			02															41 2
499	850	FF	Indexing Cam Not Stowed			02															41 2
500	850	FF	Indexing Cam Stowed			02															41 2
501	850	FF	Ampoule Not Processing			02															41 2
502	850	FF	Ampoule Processing			02															41 2
503	850	FF	SEM Index Motor RCCB On Stat			02															41 2
504	850	FF	SEM Index Motor RCCB Off Stat			02															41 2
505	850	FF	Fail Safe Brake RCCB Off			02															41 2
506	850	FF	Fail Safe Brake RCCB On			02															41 2
507	850	FF	Core Hold Down Not Retracted			02															41 2
508	850	FF	Core Hold Down Retracted			02															41 2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 22 of 38)

ENT NO.	CON.	DESCRIPTION	CMD	UNIT SEL	MNSO G./	NMOS /GD	S/O/Y	TP	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TY/P	MON REQ ---/ENT	CAL XCON	CAL LOP	CDT ?T	RC IO DE	SID NO.	EXP IP ID	TAB LAB LE
509	850	FF Core Hold Down Not Extended			02															41	2
510	850	FF Core Hold Down Extended			02															41	2
511	850	FF Core HD Motor RCCB Off			02															41	2
512	850	FF Core HD Motor RCCB On			02															41	2
513	850	FF Ampoule Support Not Retracted			02															41	2
514	850	FF Ampoule Support Retracted			02															41	2
515	850	FF Ampoule Support Not Secure			02															41	2
516	850	FF Ampoule Support Secure			02															41	2
517	850	FF Ampoule Spt Plt Mtr RCCB Off			02															41	2
518	850	FF Ampoule Spt Plt Mtr RCCB On			02															41	2
519	850	FF Ampoule Align Not Retracted			02															41	2
520	850	FF Ampoule Align Retracted			02															41	2
521	850	FF PCS Utility RCCB Off			02															41	2
522	850	FF PCS Utility RCCB On			02															41	2
523	850	FF System Bus Relay Off			02															41	2
524	850	FF System Bus Relay On			02															41	2
525	850	FF Furnace Position Not Home			02															41	2
526	850	FF Furnace Position Home			02															41	2
527	850	FF Furn Extrme Trvl Not Exceeded			02															41	2
528	850	FF Furn Extreme Trvl Exceeded			02															41	2
529	850	FF Step Motor Drive RCCB Off			02															41	2
530	850	FF Step Motor Drive RCCB On			02															41	2
531	850	FF Step Motor Clutch RCCB Off			02															41	2
532	850	FF Step Motor Clutch RCCB On			02															41	2
533	850	FF Rapid Xlation Mtr RCCB Off			02															41	2
534	850	FF Rapid Xlation Mtr RCCB On			02															41	2
535	850	FF Rapid Xlation Clutch RCCB Off			02															41	2
536	850	FF Rapid Xlation Clutch RCCB On			02															41	2
537	850	FF Water Inlet Valve RCCB Off			02															41	2
538	850	FF Water Inlet Valve RCCB On			02															41	2
																				41	2
0 3	0 6	0 7			3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 23 of 38)

ENT NO.	C O R . R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
539	850	FF	Vacuum Vent Valve Closed			02														41	2
540	850	FF	Vacuum Vent Valve Open			02														41	2
541	850	FF	Vacuum Vent Vlv RCCB Off			02														41	2
542	850	FF	Vacuum Vent Vlv RCCB On			02														41	2
543	850	FF	IFEA ABS Press 2 RCCB Off			02														41	2
544	850	FF	IFEA ABS Press 2 RCCB On			02														41	2
545	850	FF	IFEA ABS Press 1 RCCB Off			02														41	2
546	850	FF	IFEA ABS Press 1 RCCB On			02														41	2
547	850	FF	Argon Fill Valve Closed			02														41	2
548	850	FF	Argon Fill Valve Open			02														41	2
549	850	FF	Argon Fill Valve RCCB Off			02														41	2
550	850	FF	Argon Fill Valve RCCB On			02														41	2
551	850	FF	SEM Indexing Jog CW Status			02														41	2
552	850	FF	SEM Indexing Jog CCW Status			02														41	2
553	850	FF	Ampoule 5 Failure 2 Status			02														41	2
554	850	FF	Ampoule 5 Failure 1 Status			02														41	2
555	850	FF	Ampoule 4 Failure 2 Status			02														41	2
556	850	FF	Ampoule 4 Failure 1 Status			02														41	2
557	850	FF	Ampoule 3 Failure 2 Status			02														41	2
558	850	FF	Ampoule 3 Failure 1 Status			02														41	2
559	850	FF	Ampoule 2 Failure 2 Status			02														41	2
560	850	FF	Ampoule 2 Failure 1 Status			02														41	2
561	850	FF	Ampoule 1 Failure 2 Status			02														41	2
562	850	FF	Ampoule 1 Failure 1 Status			02														41	2
563	850	FF	Water Outlet Valve Bypass			02														41	2
564	850	FF	Water Outlet Valve Normal			02														41	2
565	850	FF	Water Outlet Vlv RCCB Off			02														41	2
566	850	FF	Water Outlet Vlv RCCB On			02														41	2
567	850	FF	Water Inlet Valve Bypass			02														41	2
568	850	FF	Water Inlet Valve Normal			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 24 of 38)

ENT NO.	C O R . R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A E X C P F	L . C O	////////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
569	850	FF	Mech Pulsing Mod RCCB Off			02															41	2
570	850	FF	Mech Pulsing Mod RCCB On			02															41	2
571	850	FF	Cartridge 6 Failure 2 Status			02															41	2
572	850	FF	Cartridge 6 Failure 1 Status			02															41	2
573	850	FF	Cartridge 5 Failure 2 Status			02															41	2
574	850	FF	Cartridge 5 Failure 1 Status			02															41	2
575	850	FF	Cartridge 4 Failure 2 Status			02															41	2
576	850	FF	Cartridge 4 Failure 1 Status			02															41	2
577	850	FF	Cartridge 3 Failure 2 Status			02															41	2
578	850	FF	Cartridge 3 Failure 1 Status			02															41	2
579	850	FF	Cartridge 2 Failure 2 Status			02															41	2
580	850	FF	Cartridge 2 Failure 1 Status			02															41	2
581	850	FF	Cartridge 1 Failure 2 Status			02															41	2
582	850	FF	Cartridge 1 Failure 1 Status			02															41	2
583	850	FF	Ampoule 6 Failure 2 Status			02															41	2
584	850	FF	Ampoule 6 Failure 1 Status			02															41	2
585	850	FF	Hot Boost Mod A RCCB Off			02															41	2
586	850	FF	Hot Boost Mod A RCCB On			02															41	2
587	850	FF	Cold Main Red Mod RCCB Off			02															41	2
588	850	FF	Cold Main Red Mod RCCB On			02															41	2
589	850	FF	Cold Main Prim Mod RCCB Off			02															41	2
590	850	FF	Cold Main Prim Mod RCCB On			02															41	2
591	850	FF	Cold Guard Mod RCCB Off			02															41	2
592	850	FF	Cold Guard Mod RCCB On			02															41	2
593	850	FF	Peltier Conn Retracted-Not			02															41	2
594	850	FF	Peltier Conn Retracted			02															41	2
595	850	FF	Peltier Conn Extended-Not			02															41	2
596	850	FF	Peltier Conn Extended			02															41	2
597	850	FF	Peltier Conn Motor RCCB Off			02															41	2
598	850	FF	Peltier Conn Motor RCCB On			02															41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0	

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 25 of 38)

ENT NO.	C O R . R	N O	DESCRIPTION	C M D U	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . C O F	SID NO.	E X P I D	T A B L E
599	850	FF	Peltier Pulsing Drv RCCB Off			02												41	2
600	850	FF	Peltier Pulsing Drv RCCB On			02												41	2
601	850	FF	SCS Airflow 1 Status			02												41	2
602	850	FF	PDS Airflow 1 Status			02												41	2
603	850	FF	PCS Airflow 2 Status			02												41	2
604	850	FF	PCS Airflow 1 Status			02												41	2
605	850	FF	Hot Main Red Mod B RCCB Off			02												41	2
606	850	FF	Hot Main Red Mod B RCCB On			02												41	2
607	850	FF	Hot Main Red Mod A RCCB Off			02												41	2
608	850	FF	Hot Main Red Mod A RCCB On			02												41	2
609	850	FF	Hot Main Prim Mod B RCCB Off			02												41	2
610	850	FF	Hot Main Prim Mod B RCCB On			02												41	2
611	850	FF	HotMain Prim Mod A RCCB Off			02												41	2
612	850	FF	HotMain Prim Mod A RCCB On			02												41	2
613	850	FF	Hot Guard Module RCCB Off			02												41	2
614	850	FF	Hot Guard Module RCCB On			02												41	2
615	850	FF	Hot Boost Mod B RCCB Off			02												41	2
616	850	FF	Hot Boost Mod B RCCB On			02												41	2
617	850	FF	Hot Main Prim Htr Ctl Temp 1			02												41	2
618	850	FF	Cold Main Red Htr Ctl Temp 1			02												41	2
619	850	FF	TC Group A Calibration Type B			02												41	2
620	850	FF	TC Group A Calibration Type S			02												41	2
621	850	FF	TC Group A Calibration Type K			02												41	2
622	850	FF	Cold Guard Heater Ctl Temp 2			02												41	2
623	850	FF	Cold Main Prim Htr Ctl Temp 2			02												41	2
624	850	FF	Booster Heater Ctl Temp 2			02												41	2
625	850	FF	Hot Main Red Htr Ctl Temp 2			02												41	2
626	850	FF	Hot Main Prim Htr Ctl Temp 2			02												41	2
627	850	FF	Hot Guard Heater Ctl Temp 2			02												41	2
628	850	FF	TC Group B Calibration Type B			02												41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7		6 5	6 6	6 7	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 26 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A E X C O P F	L . C	////////////// C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
629	850	FF	TC Group B Calibration Type S			02															41	2
630	850	FF	TC Group B Calibration Type K			02															41	2
631	850	FF	IFEA Coolant Flow #2 Status			02															41	2
632	850	FF	IFEA Coolant Flow #1 Status			02															41	2
633	850	FF	Sample 4 Temp 1			02															41	2
634	850	FF	Sample 3 Temp 1			02															41	2
635	850	FF	Sample 2 Temp 1			02															41	2
636	850	FF	Sample 1 Temp 1			02															41	2
637	850	FF	Cold Main Red Htr Ctl Temp 2			02															41	2
638	850	FF	TC Group D Calibration Type B			02															41	2
639	850	FF	TC Group D Calibration Type S			02															41	2
640	850	FF	TC Group D Calibration Type K			02															41	2
641	850	FF	Cold Guard Heater Ctl Temp 1			02															41	2
642	850	FF	Cold Main Prim Htr Ctl Temp 1			02															41	2
643	850	FF	Booster Heater Ctl Temp 1			02															41	2
644	850	FF	Hot Guard Heater Ctl Temp 1			02															41	2
645	850	FF	TC Group C Calibration Type B			02															41	2
646	850	FF	TC Group C Calibration Type S			02															41	2
647	850	FF	TC Group C Calibration Type K			02															41	2
648	850	FF	Hot Main Red Htr Ctl Temp 1			02															41	2
649	850	FF	Sample 2 Temp 4			02															41	2
650	850	FF	Sample 1 Temp 4			02															41	2
651	850	FF	Sample 6 Temp 3			02															41	2
652	850	FF	Sample 5 Temp 3			02															41	2
653	850	FF	Sample 4 Temp 3			02															41	2
654	850	FF	Sample 3 Temp 3			02															41	2
655	850	FF	Sample 2 Temp 3			02															41	2
656	850	FF	Sample 1 Temp 3			02															41	2
657	850	FF	Sample 6 Temp 2			02															41	2
658	850	FF	Sample 5 Temp 2			02															41	2
03	067			34		43	45	47	48	51	53	55	57	65	666	67	71	72	75	78	80	

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 27 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
659	850	FF	Sample 4 Temp 2			02														41	2
660	850	FF	Sample 3 Temp 2			02														41	2
661	850	FF	Sample 2 Temp 2			02														41	2
662	850	FF	Sample 1 Temp 2			02														41	2
663	850	FF	Sample 6 Temp 1			02														41	2
664	850	FF	Sample 5 Temp 1			02														41	2
665	850	FF	Sample 6 Temp 6			02														41	2
666	850	FF	Sample 5 Temp 6			02														41	2
667	850	FF	Sample 4 Temp 6			02														41	2
668	850	FF	Sample 3 Temp 6			02														41	2
669	850	FF	Sample 2 Temp 6			02														41	2
670	850	FF	Sample 1 Temp 6			02														41	2
671	850	FF	Sample 6 Temp 5			02														41	2
672	850	FF	Sample 5 Temp 5			02														41	2
673	850	FF	Sample 4 Temp 5			02														41	2
674	850	FF	Sample 3 Temp 5			02														41	2
675	850	FF	Sample 2 Temp 5			02														41	2
676	850	FF	Sample 1 Temp 5			02														41	2
677	850	FF	Sample 6 Temp 4			02														41	2
678	850	FF	Sample 5 Temp 4			02														41	2
679	850	FF	Sample 4 Temp 4			02														41	2
680	850	FF	Sample 3 Temp 4			02														41	2
681	850	FF	Sample 4 CJ Block Temp 1			02														41	2
682	850	FF	Sample 3 CJ Block Temp 2			02														41	2
683	850	FF	Sample 3 CJ Block Temp 1			02														41	2
684	850	FF	Sample 2 CJ Block Temp 2			02														41	2
685	850	FF	Sample 2 CJ Block Temp 1			02														41	2
686	850	FF	Sample 1 CJ Block Temp 2			02														41	2
687	850	FF	Sample 1 CJ Block Temp 1			02														41	2
688	850	FF	RFM Water Outlet Temp			02														41	2
0 3	0 6	0 7				3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 28 of 38)

ENT NO.	C O R R . .	O N .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G S /	S O W D I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
689	850	FF	Cold Zone CJ Block Temp 2			02														41	2
690	850	FF	Cold Zone CJ Block Temp 1			02														41	2
691	850	FF	Hot Zone CJ Block Temp 1			02														41	2
692	850	FF	Hot Zone CJ Block Temp 2			02														41	2
693	850	FF	RFM Hot End Shell Temp			02														41	2
694	850	FF	RFM Cold End Shell Temp			02														41	2
695	850	FF	IFEA Water Inlet Temp			02														41	2
696	850	FF	IFEA Water Outlet Temp			02														41	2
697	850	FF	RTD Mux 3 Calibration - Low			02														41	2
698	850	FF	RTD Mux 3 Calibration - High			02														41	2
699	850	FF	RTD Mux 2 Calibration - Low			02														41	2
700	850	FF	RTD Mux 2 Calibration - High			02														41	2
701	850	FF	RTD Mux 1 Calibration - Low			02														41	2
702	850	FF	RTD Mux 1 Calibration - High			02														41	2
703	850	FF	IFEA Upper Atmosphere Temp			02														41	2
704	850	FF	IFEA Lower Atmosphere Temp			02														41	2
705	850	FF	FTS Stepping Motor Temp			02														41	2
706	850	FF	SEM Track Temp			02														41	2
707	850	FF	Ampoule Alignment Arm Temp			02														41	2
708	850	FF	Sample 6 CJ Block Temp 2			02														41	2
709	850	FF	Sample 6 CJ Block Temp 1			02														41	2
710	850	FF	Sample 5 CJ Block Temp 2			02														41	2
711	850	FF	Sample 5 CJ Block Temp 1			02														41	2
712	850	FF	Sample 4 CJ Block Temp 2			02														41	2
713	850	FF	Cold Main Red Heater Current			02														41	2
714	850	FF	Cold Main Red Heater Voltage			02														41	2
715	850	FF	Cold Main Primary Heater Cur			02														41	2
716	850	FF	Cold Main Primary Heater Volt			02														41	2
717	850	FF	Cold Guard Heater Current			02														41	2
718	850	FF	Cold Guard Heater Voltage			02														41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 29 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
719	850	FF	RTD Mux 8 Calibration - Low			02														41	2
720	850	FF	RTD Mux 8 Calibration - High			02														41	2
721	850	FF	RTD Mux 7 Calibration - Low			02														41	2
722	850	FF	RTD Mux 7 Calibration - High			02														41	2
723	850	FF	RTD Mux 6 Calibration - Low			02														41	2
724	850	FF	RTD Mux 6 Calibration - High			02														41	2
725	850	FF	RTD Mux 5 Calibration - Low			02														41	2
726	850	FF	RTD Mux 5 Calibration - High			02														41	2
727	850	FF	RTD Mux 4 Calibration - Low			02														41	2
728	850	FF	RTD Mux 4 Calibration - High			02														41	2
729	850	FF	IFEA Lower Humidity			02														41	2
730	850	FF	Rapid Translation Motor RPM			02														41	2
731	850	FF	Indexing CAM Rotary Position			02														41	2
732	850	FF	Furnace Linear Position			02														41	2
733	850	FF	Stepping Motor Phase B Cur			02														41	2
734	850	FF	Stepping Motor Phase B Volt			02														41	2
735	850	FF	Stepping Motor Phase A Cur			02														41	2
736	850	FF	Stepping Motor Phase A Volt			02														41	2
737	850	FF	Hot Main Red Heater Current			02														41	2
738	850	FF	Hot Main Red Heater Voltage			02														41	2
739	850	FF	Hot Main Primary Heater Cur			02														41	2
740	850	FF	Hot Main Primary Heater Volt			02														41	2
741	850	FF	Hot Guard Heater Current			02														41	2
742	850	FF	Hot Guard Heater Voltage			02														41	2
743	850	FF	Hot Boost Heater Current			02														41	2
744	850	FF	Hot Boost Heater Voltage			02														41	2
745	850	FF	SMS Board Velocity Reading			02														41	2
746	850	FF	Experiment Main Bus Voltage			02														41	2
747	850	FF	Experiment Main Bus Current			02														41	2
748	850	FF	IFEA Absolute Pressure 2			02														41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 30 of 38)

ENT NO.	C O R	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . E V N C T	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
749	850	FF	IFEA Absolute Pressure 1			02														41	2
750	850	FF	IFEA Upper Humidity			02														41	2
001	851	RC	SEM Index Motor RCCB On Stat			02														41	2
002	851	RC	SEM Index Motor RCCB Off Stat			02														41	2
003	851	RC	Ampoule Not Processing			02														41	2
004	851	RC	Ampoule Processing			02														41	2
005	851	RC	Indexing Cam Not Stowed			02														41	2
006	851	RC	Indexing Cam Stowed			02														41	2
007	851	RC	Car Spacer Plt Gap Lim-Not			02														41	2
008	851	RC	Car Spacer Plt Gap Lim			02														41	2
009	851	RC	Car Trk Extr Left Limit-Not			02														41	2
010	851	RC	Car Trk Extr Left Limit			02														41	2
011	851	RC	Car Trk Extr Right Lim-Not			02														41	2
012	851	RC	Car Trk Extr Right Lim			02														41	2
013	851	RC	Ampoule Align Mtr RCCB Off			02														41	2
014	851	RC	Ampoule Align Mtr RCCB On			02														41	2
015	851	RC	Ampoule Align Not Extended			02														41	2
016	851	RC	Ampoule Align Extended			02														41	2
017	851	RC	Ampoule Align Not Retracted			02														41	2
018	851	RC	Ampoule Align Retracted			02														41	2
019	851	RC	Ampoule Spt Plt Mtr RCCB Off			02														41	2
020	851	RC	Ampoule Spt Plt Mtr RCCB On			02														41	2
021	851	RC	Ampoule Support Not Secure			02														41	2
022	851	RC	Ampoule Support Secure			02														41	2
023	851	RC	Ampoule Support Not Retracted			02														41	2
024	851	RC	Ampoule Support Retracted			02														41	2
025	851	RC	Core HD Motor RCCB Off			02														41	2
026	851	RC	Core HD Motor RCCB On			02														41	2
027	851	RC	Core Hold Down Not Extended			02														41	2
028	851	RC	Core Hold Down Extended			02														41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 31 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L . E X C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
029	851	RC	Core Hold Down Not Retracted			02														41	2
030	851	RC	Core Hold Down Retracted			02														41	2
031	851	RC	Fail Safe Brake RCCB Off			02														41	2
032	851	RC	Fail Safe Brake RCCB On			02														41	2
033	851	RC	Rapid Xlation Clutch RCCB Off			02														41	2
034	851	RC	Rapid Xlation Clutch RCCB On			02														41	2
035	851	RC	Rapid Xlation Mtr RCCB Off			02														41	2
036	851	RC	Rapid Xlation Mtr RCCB On			02														41	2
037	851	RC	Step Motor Clutch RCCB Off			02														41	2
038	851	RC	Step Motor Clutch RCCB On			02														41	2
039	851	RC	Step Motor Drive RCCB Off			02														41	2
040	851	RC	Step Motor Drive RCCB On			02														41	2
041	851	RC	Furn Extrme Trvl Not Exceeded			02														41	2
042	851	RC	Furn Extrdme Trvl Exceeded			02														41	2
043	851	RC	Furnace Position Not Home			02														41	2
044	851	RC	Furnace Position Home			02														41	2
045	851	RC	System Bus Relay Off			02														41	2
046	851	RC	System Bus Relay On			02														41	2
047	851	RC	PCS Utility RCCB Off			02														41	2
048	851	RC	PCS Utility RCCB On			02														41	2
049	851	RC	SEM Indexing Jog CW Status			02														41	2
050	851	RC	SEM Indexing Jog CCW Status			02														41	2
051	851	RC	Argon Fill Valve RCCB Off			02														41	2
052	851	RC	Argon Fill Valve RCCB On			02														41	2
053	851	RC	Argon Fill Valve Closed			02														41	2
054	851	RC	Argon Fill Valve Open			02														41	2
055	851	RC	IFEA ABS Press 1 RCCB Off			02														41	2
056	851	RC	IFEA ABS Press 1 RCCB On			02														41	2
057	851	RC	IFEA ABS Press 2 RCCB Off			02														41	2
058	851	RC	IFEA ABS Press 2 RCCB On			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 32 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L	U S A G E K	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ ENV NTP	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
059	851		RC Vacuum Vent Vlv RCCB Off			02														41	2
060	851		RC Vacuum Vent Vlv RCCB On			02														41	2
061	851		RC Vacuum Vent Valve Closed			02														41	2
062	851		RC Vacuum Vent Valve Open			02														41	2
063	851		RC Water Inlet Valve RCCB Off			02														41	2
064	851		RC Water Inlet Valve RCCB On			02														41	2
065	851		RC Water Inlet Valve Bypass			02														41	2
066	851		RC Water Inlet Valve Normal			02														41	2
067	851		RC Water Outlet Vlv RCCB Off			02														41	2
068	851		RC Water Outlet Vlv RCCB On			02														41	2
069	851		RC Water Outlet Valve Bypass			02														41	2
070	851		RC Water Outlet Valve Normal			02														41	2
071	851		RC Ampoule 1 Failure 2 Status			02														41	2
072	851		RC Ampoule 1 Failure 1 Status			02														41	2
073	851		RC Ampoule 2 Failure 2 Status			02														41	2
074	851		RC Ampoule 2 Failure 1 Status			02														41	2
075	851		RC Ampoule 3 Failure 2 Status			02														41	2
076	851		RC Ampoule 3 Failure 1 Status			02														41	2
077	851		RC Ampoule 4 Failure 2 Status			02														41	2
078	851		RC Ampoule 4 Failure 1 Status			02														41	2
079	851		RC Ampoule 5 Failure 2 Status			02														41	2
080	851		RC Ampoule 5 Failure 1 Status			02														41	2
081	851		RC Ampoule 6 Failure 2 Status			02														41	2
082	851		RC Ampoule 6 Failure 1 Status			02														41	2
083	851		RC Cartridge 1 Failure 2 Status			02														41	2
084	851		RC Cartridge 1 Failure 1 Status			02														41	2
085	851		RC Cartridge 2 Failure 2 Status			02														41	2
086	851		RC Cartridge 2 Failure 1 Status			02														41	2
087	851		RC Cartridge 3 Failure 2 Status			02														41	2
088	851		RC Cartridge 3 Failure 1 Status			02														41	2
03	06	07				39	40	43	45	47	48	51	53	55	57	65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 33 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
089	851	RC	Cartridge 4 Failure 2 Status			02														41	2
090	851	RC	Cartridge 4 Failure 1 Status			02														41	2
091	851	RC	Cartridge 5 Failure 2 Status			02														41	2
092	851	RC	Cartridge 5 Failure 1 Status			02														41	2
093	851	RC	Cartridge 6 Failure 2 Status			02														41	2
094	851	RC	Cartridge 6 Failure 1 Status			02														41	2
095	851	RC	Mech Pulsing Mod RCCB On			02														41	2
096	851	RC	Mech Pulsing Mod RCCB Off			02														41	2
097	851	RC	Peltier Pulsing Drv RCCB Off			02														41	2
098	851	RC	Peltier Pulsing Drv RCCB On			02														41	2
099	851	RC	Peltier Conn Motor RCCB Off			02														41	2
100	851	RC	Peltier Conn Motor RCCB On			02														41	2
101	851	RC	Peltier Conn Extended-Not			02														41	2
102	851	RC	Peltier Conn Extended			02														41	2
103	851	RC	Peltier Conn Retracted-Not			02														41	2
104	851	RC	Peltier Conn Retracted			02														41	2
105	851	RC	Cold Guard Mod RCCB Off			02														41	2
106	851	RC	Cold Guard Mod RCCB On			02														41	2
107	851	RC	Cold Main Prim Mod RCCB Off			02														41	2
108	851	RC	Cold Main Prim Mod RCCB On			02														41	2
109	851	RC	Cold Main Red Mod RCCB Off			02														41	2
110	851	RC	Cold Main Red Mod RCCB On			02														41	2
111	851	RC	Hot Boost Mod A RCCB Off			02														41	2
112	851	RC	Hot Boost Mod A RCCB On			02														41	2
113	851	RC	Hot Boost Mod B RCCB Off			02														41	2
114	851	RC	Hot Boost Mod B RCCB On			02														41	2
115	851	RC	Hot Guard Module RCCB Off			02														41	2
116	851	RC	Hot Guard Module RCCB On			02														41	2
117	851	RC	HotMain Prim Mod A RCCB Off			02														41	2
118	851	RC	HotMain Prim Mod A RCCB On			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 34 of 38)

ENT NO.	C O R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E N T	C A L E V C P F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
119	851	RC	Hot Main Prim Mod B RCCB Off			02														41	2
120	851	RC	Hot Main Prim Mod B RCCB On			02														41	2
121	851	RC	Hot Main Red Mod A RCCB Off			02														41	2
122	851	RC	Hot Main Red Mod A RCCB On			02														41	2
123	851	RC	Hot Main Red Mod B RCCB Off			02														41	2
124	851	RC	Hot Main Red Mod B RCCB On			02														41	2
125	851	RC	PCS Airflow 2 Status			02														41	2
126	851	RC	PCS Airflow 1 Status			02														41	2
127	851	RC	SCS Airflow 1 Status			02														41	2
128	851	RC	PDS Airflow 1 Status			02														41	2
129	851	RC	IFEA Coolant Flow #2 Status			02														41	2
130	851	RC	IFEA Coolant Flow #1 Status			02														41	2
131	851	RC	TC Group B Calibration Type S			02														41	2
132	851	RC	TC Group B Calibration Type K			02														41	2
133	851	RC	Hot Guard Heater Ctl Temp 2			02														41	2
134	851	RC	TC Group B Calibration Type B			02														41	2
135	851	RC	Hot Main Red Htr Ctl Temp 2			02														41	2
136	851	RC	Hot Main Prim Htr Ctl Temp 2			02														41	2
137	851	RC	Cold Main Prim Htr Ctl Temp 2			02														41	2
138	851	RC	Booster Heater Ctl Temp 2			02														41	2
139	851	RC	TC Group A Calibration Type K			02														41	2
140	851	RC	Cold Guard Heater Ctl Temp 2			02														41	2
141	851	RC	TC Group A Calibration Type B			02														41	2
142	851	RC	TC Group A Calibration Type S			02														41	2
143	851	RC	Hot Main Prim Htr Ctl Temp 1			02														41	2
144	851	RC	Cold Main Red Htr Ctl Temp 1			02														41	2
145	851	RC	TC Group C Calibration Type K			02														41	2
146	851	RC	Hot Main Red Htr Ctl Temp 1			02														41	2
147	851	RC	TC Group C Calibration Type B			02														41	2
148	851	RC	TC Group C Calibration Type S			02														41	2

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 35 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U L	U S A G E	MN SO G.	NM OS /G W D S	S O I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
149	851	RC	Booster Heater Ctl Temp 1			02														41	2
150	851	RC	Hot Guard Heater Ctl Temp 1			02														41	2
151	851	RC	Cold Guard Heater Ctl Temp 1			02														41	2
152	851	RC	Cold Main Prim Htr Ctl Temp 1			02														41	2
153	851	RC	TC Group D Calibration Type S			02														41	2
154	851	RC	TC Group D Calibration Type K			02														41	2
155	851	RC	Cold Main Red Htr Ctl Temp 2			02														41	2
156	851	RC	TC Group D Calibration Type B			02														41	2
157	851	RC	Sample 2 Temp 1			02														41	2
158	851	RC	Sample 1 Temp 1			02														41	2
159	851	RC	Sample 4 Temp 1			02														41	2
160	851	RC	Sample 3 Temp 1			02														41	2
161	851	RC	Sample 6 Temp 1			02														41	2
162	851	RC	Sample 5 Temp 1			02														41	2
163	851	RC	Sample 2 Temp 2			02														41	2
164	851	RC	Sample 1 Temp 2			02														41	2
165	851	RC	Sample 4 Temp 2			02														41	2
166	851	RC	Sample 3 Temp 2			02														41	2
167	851	RC	Sample 6 Temp 2			02														41	2
168	851	RC	Sample 5 Temp 2			02														41	2
169	851	RC	Sample 2 Temp 3			02														41	2
170	851	RC	Sample 1 Temp 3			02														41	2
171	851	RC	Sample 4 Temp 3			02														41	2
172	851	RC	Sample 3 Temp 3			02														41	2
173	851	RC	Sample 6 Temp 3			02														41	2
174	851	RC	Sample 5 Temp 3			02														41	2
175	851	RC	Sample 2 Temp 4			02														41	2
176	851	RC	Sample 1 Temp 4			02														41	2
177	851	RC	Sample 4 Temp 4			02														41	2
178	851	RC	Sample 3 Temp 4			02														41	2

0	0	0	3	4	4	4	4	4	5	5	5	5	6	6	6	7	7	7	7	8
3	6	7	9	0	3	5	7	8	1	3	5	7	5	6	7	1	2	5	8	0

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 36 of 38)

ENT NO.	C O R R .	N O	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	C A --- L E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
179	851	RC	Sample 6 Temp 4			02														41	2
180	851	RC	Sample 5 Temp 4			02														41	2
181	851	RC	Sample 2 Temp 5			02														41	2
182	851	RC	Sample 1 Temp 5			02														41	2
183	851	RC	Sample 4 Temp 5			02														41	2
184	851	RC	Sample 3 Temp 5			02														41	2
185	851	RC	Sample 6 Temp 5			02														41	2
186	851	RC	Sample 5 Temp 5			02														41	2
187	851	RC	Sample 2 Temp 6			02														41	2
188	851	RC	Sample 1 Temp 6			02														41	2
189	851	RC	Sample 4 Temp 6			02														41	2
190	851	RC	Sample 3 Temp 6			02														41	2
191	851	RC	Sample 5 Temp 6			02														41	2
192	851	RC	Sample 6 Temp 6			02														41	2
193	851	RC	IFEA Water Inlet Temp			02														41	2
194	851	RC	IFEA Water Outlet Temp			02														41	2
195	851	RC	RFM Hot End Shell Temp			02														41	2
196	851	RC	RFM Cold End Shell Temp			02														41	2
197	851	RC	Hot Zone CJ Block Temp 1			02														41	2
198	851	RC	Hot Zone CJ Block Temp 2			02														41	2
199	851	RC	Cold Zone CJ Block Temp 2			02														41	2
200	851	RC	Cold Zone CJ Block Temp 1			02														41	2
201	851	RC	Sample 1 CJ Block Temp 1			02														41	2
202	851	RC	RFM Water Outlet Temp			02														41	2
203	851	RC	Sample 2 CJ Block Temp 1			02														41	2
204	851	RC	Sample 1 CJ Block Temp 2			02														41	2
205	851	RC	Sample 3 CJ Block Temp 1			02														41	2
206	851	RC	Sample 2 CJ Block Temp 2			02														41	2
207	851	RC	Sample 4 CJ Block Temp 1			02														41	2
208	851	RC	Sample 3 CJ Block Temp 2			02														41	2

0 3	0 6	0 7	3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 37 of 38)

ENT NO.	C O R .	N O	DESCRIPTION	C M D U	U S A G E L K	MN SO G.	NM OS /G W D S	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ --- E V N T	C A L . E X C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
209	851	RC	Sample 5 CJ Block Temp 1			02														41	2
210	851	RC	Sample 4 CJ Block Temp 2			02														41	2
211	851	RC	Sample 6 CJ Block Temp 1			02														41	2
212	851	RC	Sample 5 CJ Block Temp 2			02														41	2
213	851	RC	Ampoule Alignment Arm Temp			02														41	2
214	851	RC	Sample 6 CJ Block Temp 2			02														41	2
215	851	RC	FTS Stepping Motor Temp			02														41	2
216	851	RC	SEM Track Temp			02														41	2
217	851	RC	IFEA Upper Atmosphere Temp			02														41	2
218	851	RC	IFEA Lower Atmosphere Temp			02														41	2
219	851	RC	RTD Mux 1 Calibration - Low			02														41	2
220	851	RC	RTD Mux 1 Calibration - High			02														41	2
221	851	RC	RTD Mux 2 Calibration - Low			02														41	2
222	851	RC	RTD Mux 2 Calibration - High			02														41	2
223	851	RC	RTD Mux 3 Calibration - Low			02														41	2
224	851	RC	RTD Mux 3 Calibration - High			02														41	2
225	851	RC	RTD Mux 4 Calibration - Low			02														41	2
226	851	RC	RTD Mux 4 Calibration - High			02														41	2
227	851	RC	RTD Mux 5 Calibration - Low			02														41	2
228	851	RC	RTD Mux 5 Calibration - High			02														41	2
229	851	RC	RTD Mux 6 Calibration - Low			02														41	2
230	851	RC	RTD Mux 6 Calibration - High			02														41	2
231	851	RC	RTD Mux 7 Calibration - Low			02														41	2
232	851	RC	RTD Mux 7 Calibration - High			02														41	2
233	851	RC	RTD Mux 8 Calibration - Low			02														41	2
234	851	RC	RTD Mux 8 Calibration - High			02														41	2
235	851	RC	Cold Guard Heater Current			02														41	2
236	851	RC	Cold Guard Heater Voltage			02														41	2
237	851	RC	Cold Main Primary Heater Cur			02														41	2
238	851	RC	Cold Main Primary Heater Volt			02														41	2
0 3	0 6	0 7		3 9	4 0	4 3	4 5	4 7	4 8	5 1	5 3	5 5	5 7	6 5	6 6	6 7	7 1	7 2	7 5	7 8	8 0

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TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 38 of 38)

ENT NO.	CORR. NOR.	DESCRIPTION	CMD UPLINK	MNSO G./	NMOS G/ WDS	SOI XD	TYP E	DATA DESCRIPTION START #WD	START BT	END #WD	END BT	DATA VALUE TYP E	MON REQ EVNT	CAL EXC OFL	/// CDT ?/	RC IO DE	SID NO.	EXP IDE	TAB LE
239	851	RC Cold Main Red Heater Current		02														41	2
240	851	RC Cold Main Red Heater Voltage		02														41	2
241	851	RC Hot Boost Heater Current		02														41	2
242	851	RC Hot Boost Heater Voltage		02														41	2
243	851	RC Hot Guard Heater Current		02														41	2
244	851	RC Hot Guard Heater Voltage		02														41	2
245	851	RC Hot Main Primary Heater Cur		02														41	2
246	851	RC Hot Main Primary Heater Volt		02														41	2
247	851	RC Hot Main Red Heater Current		02														41	2
248	851	RC Hot Main Red Heater Voltage		02														41	2
249	851	RC Stepping Motor Phase A Cur		02														41	2
250	851	RC Stepping Motor Phase A Volt		02														41	2
251	851	RC Stepping Motor Phase B Cur		02														41	2
252	851	RC Stepping Motor Phase B Volt		02														41	2
253	851	RC Indexing CAM Rotary Position		02														41	2
254	851	RC Furnace Linear Position		02														41	2
255	851	RC IFEA Lower Humidity		02														41	2
256	851	RC Rapid Translation Motor RPM		02														41	2
257	851	RC IFEA Absolute Pressure 1		02														41	2
258	851	RC IFEA Upper Humidity		02														41	2
259	851	RC Experiment Main Bus Current		02														41	2
260	851	RC IFEA Absolute Pressure 2		02														41	2
261	851	RC SMS Board Velocity Reading		02														41	2
262	851	RC Experiment Main Bus Voltage		02														41	2
263	851	Process Elapsed Time - Seconds		02														41	2
264	851	Go/NoGo Error Override		02														41	2
265	851	CGF Sytstem State		02														41	2
266	851	Auto Pressure Ctl		02														41	2
03	067		39	43	45	78		51	53	55	57		656	667	71	72	75	78	80

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TABLE 2.7-3. EVENT/EXCEPTION MONITOR REQUIREMENTS

ENTRY	CONTROL	EMR/XOA/CNT/PIE/TT/IO/OR/N	MONITOR VALUES UPPER LIMIT	MONITOR VALUES LOWER LIMIT/EXPT'D STATE	MSG GRP/CODE	MESSAGE (HIGH/SINGLE)	ERROR MSG. GRP/CODE	MESSAGE LOW	ERROR MSG. GRP/CODE	INTERLOCK TYPE/MODE/LEVEL/IGNORE/OVERRIDE/CRITICALITY	TIMEOUT/3PI/ADDRESS	EXIT GRP/CODE	TRANSITION GRP/CODE
207	106	001	-073	-128	1	HI WATER TEMP	41/14		41	300	10/CGF	41/4	
208	106	001	-077	-128	1	HI HUMIDITY LWR	41/16		41	300	10/CGF	41/4	
209	106	001	-077	-128	1	HI HUMIDITY UPR	41/18		41	300	10/CGF	41/4	
210	106	001	-004	-128	1	HI ATMOS TEMP	41/1A		41	300	10/MAN	41/4	
211	106	001	-073	-128	1	HI CLD END TEMP	41/1C		41	300	10/MAN	41/4	
212	106	001	-073	-128	1	HI HOT END TEMP	41/1E		41	300	10/MAN	41/4	
215	106	001	-009	-073	1	HI IFEA PRES 1	41/20	LO IFEA PRES 1	41/21	300	10/CGF	41/4	
216	106	001	-009	-073	1	HI IFEA PRES 2	41/22	LO IFEA PRES 2	41/23	300	10/CGF	41/4	
219	106	001	+105	-128	1	HI MAIN CURRENT	41/24		41	300	10/CGF	41/4	
220	106	001	+076	+018	1	HI MAIN VOLTAGE	41/26	LO MAIN VOLTAGE	41/27	300	10/CGF	41/4	
223	106	001		1	1	LO WATER FLOW	41/28		41	300	05/CGF	41/4	
224	106	001		1	1	LO WATER FLOW	41/2A		41	300	05/CGF	41/4	
237	106	001		1	1	NO AVIONICS AIR	41/2C		41	300	05/CGF	41/4	
238	106	001		1	1	NO AVIONICS AIR	41/2E		41	300	05/CGF	41/4	
239	106	001		1	1	NO AVIONICS AIR	41/30		41	300	05/CGF	41/4	
240	106	001		1	1	NO AVIONICS AIR	41/32		41	300	05/CGF	41/4	
265	106	001		1	1	WTR OUT BYPASS	41/34		41	300	05/MAN	41/4	
266	106	001		0	1	WTR OUT BYPASS	41/36		41	300	05/MAN	41/4	
267	106	001		1	1	WTR IN BYPASS	41/38		41	300	05/MAN	41/4	
268	106	001		0	1	WTR IN BYPASS	41/3A		41	300	05/MAN	41/4	
287	106	001		1	1	EXTRM TRVL LIM	41/3C		41	300	05/FTS	41/4	
288	106	001		0	1	EXTRM TRVL LIM	41/3E		41	300	05/FTS	41/4	
319	106	001		0	1	EXP BUS PWR OFF	41/40		41	300	05/CGF	41/4	
320	106	001		1	1	EXP BUS PWR OFF	41/42		41	300	05/CGF	41/4	

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 1 of 20)

ENTRY	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE
			A0	A1	A2	A3	A4	A5		
001	850	PC	+0000000+00	+1000000+01					41	6
002	850	PC	+0000000+00	+1000000+01					41	6
003	850	PC	+0000000+00	+1000000+01					41	6
004	850	PC	+0000000+00	+1000000+01					41	6
005	850	PC	+0000000+00	+1000000+01					41	6
138	850	PC	+0000000+00	+1000000+01					41	6
139	850	PC	+0000000+00	+1000000+01					41	6
140	850	PC	+0000000+00	+1000000+01					41	6
141	850	PC	+0000000+00	+1000000+01					41	6
142	850	PC	+0000000+00	+1000000+01					41	6
143	850	PC	+0000000+00	+1000000+01					41	6
144	850	PC	+0000000+00	+1000000+01					41	6
145	850	PC	+0000000+00	+1000000+01					41	6
146	850	PC	+0000000+00	+1000000+01					41	6
147	850	PC	+0000000+00	+1000000+01					41	6
148	850	PC	+0000000+00	+1000000+01					41	6
149	850	PC	+0000000+00	+1000000+01					41	6
150	850	PC	+0000000+00	+1000000+01					41	6
151	850	PC	+0000000+00	+1000000+01					41	6
152	850	PC	+0000000+00	+1000000+01					41	6
153	850	PC	+0000000+00	+1000000+01					41	6
154	850	PC	+0000000+00	+1000000+01					41	6
155	850	PC	+0000000+00	+1000000+01					41	6
156	850	PC	+0000000+00	+1000000+01					41	6
157	850	PC	+0000000+00	+1000000+01					41	6
158	850	PC	+0000000+00	+1000000+01					41	6
159	850	PC	+0000000+00	+1000000+01					41	6
160	850	PC	+0000000+00	+1000000+01					41	6
161	850	PC	+0000000+00	+1000000+01					41	6
162	850	PC	+0000000+00	+1000000+01					41	6
163	850	PC	+0000000+00	+1000000+01					41	6

001–003	005–007	008	018–029	030–040	041–051	052–062	063–073	079–080

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 2 of 20)

ENTRY	UNIT	CONTROL BLOCK	CONTROL ACTION/LIMIT PROCESSING	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
										EXP	TAB
				A0	A1	A2	A3	A4	A5	ID	BLK
164	850	PC		+0000000+00	+1000000+01					41	6
165	850	PC		+0000000+00	+1000000+01					41	6
166	850	PC		+0000000+00	+1000000+01					41	6
167	850	PC		+0000000+00	+1000000+01					41	6
168	850	PC		+0000000+00	+1000000+01					41	6
169	850	PC		+0000000+00	+1000000+01					41	6
170	850	PC		+0000000+00	+1000000+01					41	6
171	850	PC		+0000000+00	+1000000+01					41	6
172	850	PC		+0000000+00	+1000000+01					41	6
173	850	PC		+0000000+00	+1000000+01					41	6
174	850	PC		+0000000+00	+1000000+01					41	6
175	850	PC		+0000000+00	+1000000+01					41	6
176	850	PC		+0000000+00	+1000000+01					41	6
177	850	PC		+0000000+00	+1000000+01					41	6
178	850	PC		+0000000+00	+1000000+01					41	6
179	850	PC		+0000000+00	+1000000+01					41	6
180	850	PC		+0000000+00	+1000000+01					41	6
181	850	PC		+0000000+00	+1000000+01					41	6
182	850	PC		+0000000+00	+1000000+01					41	6
183	850	PC		+0000000+00	+1000000+01					41	6
184	850	PC		+0000000+00	+1000000+01					41	6
185	850	PC		+0000000+00	+1000000+01					41	6
187	850	PC		+0000000+00	+1000000+01					41	6
188	850	PC		+0000000+00	+1000000+01					41	6
189	850	PC		+0000000+00	+1000000+01					41	6
190	850	PC		+0000000+00	+1000000+01					41	6
191	850	PC		+0000000+00	+1000000+01					41	6
192	850	PC		+0000000+00	+1000000+01					41	6
193	850	PC		+0000000+00	+1000000+01					41	6
194	850	PC		+0000000+00	+1000000+01					41	6
195	850	PC		+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 3 of 20)

ENTRY	NUMBER	CONTROL	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						///// EXP	TABLE
				A0	A1	A2	A3	A4	A5		
196	850	PC		+0000000+00	+5000000-01					41	6
197	850	PC		+0000000+00	+5000000-01					41	6
198	850	PC		+0000000+00	+5000000-01					41	6
199	850	PC		+0000000+00	+5000000-01					41	6
200	850	PC		+0000000+00	+5000000-01					41	6
201	850	PC		+0000000+00	+5000000-01					41	6
202	850	PC		+0000000+00	+5000000-01					41	6
203	850	PC		+0000000+00	+5000000-01					41	6
204	850	PC		+0000000+00	+5000000-01					41	6
205	850	PC		+0000000+00	+5000000-01					41	6
206	850	PC		+0000000+00	+5000000-01					41	6
207	850	PC		+0000000+00	+5000000-01					41	6
208	850	PC		+0000000+00	+5000000-01					41	6
209	850	PC		+0000000+00	+5000000-01					41	6
210	850	PC		+0000000+00	+5000000-01					41	6
211	850	PC		+0000000+00	+5000000-01					41	6
212	850	PC		+0000000+00	+3663000-01					41	6
213	850	PC		+0000000+00	+9768000-02					41	6
214	850	PC		+0000000+00	+2442000-01					41	6
215	850	PC		+0000000+00	+2442000-01					41	6
216	850	PC		+0000000+00	+7326000-02					41	6
217	850	PC		+0000000+00	+7326000-02					41	6
218	850	PC		-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
219	850	PC		-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
220	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
221	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
222	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
223	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
224	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
225	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
226	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 4 of 20)

ENTRY	NUMBER	COORDINATE	NUMBER	CATEGORY	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE
					A0	A1	A2	A3	A4	A5		
227	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
228	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
229	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
230	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
231	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
232	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
233	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
234	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
235	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
236	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
237	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
238	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
239	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
240	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
241	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
242	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
243	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
244	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
245	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
246	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
247	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
248	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
249	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
250	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
251	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
252	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
253	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
254	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06		41	6
255	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
256	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
257	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 5 of 20)

ENTRY	NUMBER	CONVERSION	CONVERSION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPIRATION DATE	TABLE ID
				A0	A1	A2	A3	A4	A5		
258	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
259	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
260	850	PC		+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41 6
261	850	PC		+0000000+00	+1743900-02						41 6
262	850	PC		+0000000+00	+5086300-02						41 6
263	850	PC		+0000000+00	+1743900-02						41 6
264	850	PC		+0000000+00	+5086300-02						41 6
265	850	PC		-2566000+01	+1364100+00						41 6
266	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
267	850	PC		+0000000+00	+1627600+01						41 6
268	850	PC		+0000000+00	+7326000-02						41 6
269	850	PC		+0000000+00	+1953600-01						41 6
270	850	PC		+0000000+00	+7326000-02						41 6
271	850	PC		+0000000+00	+1953600-01						41 6
272	850	PC		+0000000+00	+7326000-02						41 6
273	850	PC		+0000000+00	+1953600-01						41 6
274	850	PC		+0000000+00	+7326000-02						41 6
275	850	PC		+0000000+00	+1953600-01						41 6
276	850	PC		+0000000+00	+7326000-02						41 6
277	850	PC		+0000000+00	+1953600-01						41 6
278	850	PC		+0000000+00	+7326000-02						41 6
279	850	PC		+0000000+00	+1953600-01						41 6
280	850	PC		+0000000+00	+7326000-02						41 6
281	850	PC		+0000000+00	+1953600-01						41 6
282	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
283	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
284	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
285	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
286	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
287	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6
288	850	PC		-2414600+03	+2297900+00	+1211300-04	-4356500-09				41 6

ENTRY	NUMBER	CONVERSION	CONVERSION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPIRATION DATE	TABLE ID
103	105	107		118	129	140	151	162	173	179	180

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 6 of 20)

ENTRY	NUMBER	COMMAND	NUMBER OF RECEIVERS	CONTACT LAMP IBIT	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5		EXPECTED DATA	EXPECTED DATA LABEL
289	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
290	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
291	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
292	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
293	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
294	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
295	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
296	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
297	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
298	850	PC			+0000000+00	+1000000+01						41	6
299	850	PC			+0000000+00	+1000000+01						41	6
300	850	PC			+0000000+00	+1000000+01						41	6
301	850	PC			+0000000+00	+1000000+01						41	6
302	850	PC			+0000000+00	+1000000+01						41	6
303	850	PC			+0000000+00	+1000000+01						41	6
304	850	PC			+0000000+00	+1000000+01						41	6
305	850	PC			+0000000+00	+1000000+01						41	6
306	850	PC			+0000000+00	+1000000+01						41	6
307	850	PC			+0000000+00	+1000000+01						41	6
308	850	PC			+0000000+00	+1000000+01						41	6
309	850	PC			+0000000+00	+1000000+01						41	6
310	850	PC			+0000000+00	+1000000+01						41	6
311	850	PC			+0000000+00	+1000000+01						41	6
312	850	PC			+0000000+00	+8302800-01						41	6
313	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
314	850	PC			-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
315	850	PC			+9760000+03	+2442000+00						41	6
316	850	PC			+9760000+03	+2442000+00						41	6
317	850	PC			+9760000+03	+2442000+00						41	6
318	850	PC			+9760000+03	+2442000+00						41	6
319	850	PC			+9760000+03	+2442000+00						41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 7 of 20)

ENTRY	NUMBER	CONVERSION	NOTATION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
										EXP	TABLE
				A0	A1	A2	A3	A4	A5		
320	850	PC	+9760000+03	+2442000+00						41	6
321	850	PC	+6810000+02	+2442000-01						41	6
322	850	PC	+6810000+02	+2442000-01						41	6
323	850	PC	+9760000+03	+2442000+00						41	6
324	850	PC	+9760000+03	+2442000+00						41	6
325	850	PC	+9760000+03	+2442000+00						41	6
326	850	PC	+9760000+03	+2442000+00						41	6
327	850	PC	+9760000+03	+2442000+00						41	6
328	850	PC	+9760000+03	+2442000+00						41	6
329	850	PC	+6810000+02	+2442000-01						41	6
330	850	PC	+6810000+02	+2442000-01						41	6
331	850	PC	+0000000+00	+1000000+01						41	6
332	850	PC	+0000000+00	+3125000+00						41	6
333	850	PC	+0000000+00	+2500000+00						41	6
334	850	PC	+0000000+00	+1000000+01						41	6
335	850	PC	+0000000+00	+3125000+00						41	6
336	850	PC	+0000000+00	+2500000+00						41	6
337	850	PC	+0000000+00	+1000000+01						41	6
338	850	PC	+0000000+00	+3125000+00						41	6
339	850	PC	+0000000+00	+2500000+00						41	6
340	850	PC	+0000000+00	+1000000+01						41	6
341	850	PC	+0000000+00	+3125000+00						41	6
342	850	PC	+0000000+00	+2500000+00						41	6
343	850	PC	+0000000+00	+7096670-04						41	6
344	850	PC	+0000000+00	+1000000+01						41	6
345	850	PC	+0000000+00	+1000000+01						41	6
346	850	PC	+0000000+00	+1000000+01						41	6
347	850	PC	+0000000+00	+1000000+01						41	6
348	850	PC	+0000000+00	+1000000+01						41	6
349	850	PC	+0000000+00	+1000000+01						41	6
350	850	PC	+0000000+00	+1000000+01						41	6
001	003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 8 of 20)

ENTRY	UNIT	CONTROL BAR	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE/LIST ID
			A0	A1	A2	A3	A4	A5		
352	850	PC	+0000000+00	+1000000+01					41	6
353	850	PC	+0000000+00	+1000000+01					41	6
354	850	PC	+0000000+00	+1000000+01					41	6
356	850	PC	+0000000+00	+1000000+01					41	6
357	850	PC	+0000000+00	+1000000+01					41	6
358	850	PC	+0000000+00	+1000000+01					41	6
360	850	PC	+0000000+00	+1000000+01					41	6
361	850	PC	+0000000+00	+1000000+01					41	6
362	850	PC	+0000000+00	+1000000+01					41	6
363	850	PC	+0000000+00	+1000000+01					41	6
364	850	PC	+0000000+00	+1000000+01					41	6
365	850	PC	+0000000+00	+1000000+01					41	6
366	850	PC	+0000000+00	+1000000+01					41	6
369	850	PC	+0000000+00	+1000000+01					41	6
370	850	PC	+0000000+00	+1000000+01					41	6
371	850	PC	+0000000+00	+1000000+01					41	6
372	850	PC	+0000000+00	+1000000+01					41	6
373	850	PC	+0000000+00	+1000000+01					41	6
374	850	PC	+0000000+00	+1000000+01					41	6
377	850	PC	+0000000+00	+1000000+01					41	6
378	850	PC	+0000000+00	+1000000+01					41	6
379	850	PC	+0000000+00	+1000000+01					41	6
380	850	PC	+0000000+00	+1000000+01					41	6
381	850	PC	+0000000+00	+1000000+01					41	6
382	850	PC	+0000000+00	+1000000+01					41	6
385	850	PC	+0000000+00	+1000000+01					41	6
386	850	PC	+0000000+00	+1000000+01					41	6
387	850	PC	+0000000+00	+1000000+01					41	6
388	850	PC	+0000000+00	+1000000+01					41	6
389	850	PC	+0000000+00	+1000000+01					41	6
390	850	PC	+0000000+00	+1000000+01					41	6

003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 9 of 20)

ENTRY	NUMBER	CONTROL OUTPUT	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXP	TAB
			A0	A1	A2	A3	A4	A5		
391	850	PC	+0000000+00	+1000000+01					41	6
392	850	PC	+0000000+00	+1000000+01					41	6
393	850	PC	+0000000+00	+1000000+01					41	6
394	850	PC	+0000000+00	+1000000+01					41	6
395	850	PC	+0000000+00	+1000000+01					41	6
396	850	PC	+0000000+00	+1000000+01					41	6
397	850	PC	+0000000+00	+1000000+01					41	6
398	850	PC	+0000000+00	+1000000+01					41	6
399	850	PC	+0000000+00	+1000000+01					41	6
400	850	PC	+0000000+00	+1000000+01					41	6
401	850	PC	+0000000+00	+1000000+01					41	6
402	850	PC	+0000000+00	+1000000+01					41	6
403	850	PC	+0000000+00	+1000000+01					41	6
404	850	PC	+0000000+00	+1000000+01					41	6
405	850	PC	+0000000+00	+1000000+01					41	6
406	850	PC	+0000000+00	+1000000+01					41	6
407	850	PC	+0000000+00	+1000000+01					41	6
408	850	PC	+0000000+00	+1000000+01					41	6
409	850	PC	+0000000+00	+1000000+01					41	6
410	850	PC	+0000000+00	+1000000+01					41	6
411	850	PC	+0000000+00	+1000000+01					41	6
412	850	PC	+0000000+00	+1000000+01					41	6
413	850	PC	+0000000+00	+1000000+01					41	6
414	850	PC	+0000000+00	+1000000+01					41	6
415	850	PC	+0000000+00	+1000000+01					41	6
417	850	PC	+0000000+00	+1000000+01					41	6
418	850	PC	+0000000+00	+1000000+01					41	6
419	850	PC	+0000000+00	+1000000+01					41	6
421	850	PC	+0000000+00	+1000000+01					41	6
422	850	PC	+0000000+00	+1000000+01					41	6
423	850	PC	+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 10 of 20)

ENTRY	UNIT	CONTROL BLOCK	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXP	TABLE
			A0	A1	A2	A3	A4	A5		
425	850	PC	+0000000+00	+1000000+01					41	6
427	850	PC	+0000000+00	+1000000+01					41	6
428	850	PC	+0000000+00	+1000000+01					41	6
429	850	PC	+0000000+00	+1000000+01					41	6
431	850	PC	+0000000+00	+1000000+01					41	6
432	850	PC	+0000000+00	+1000000+01					41	6
433	850	PC	+0000000+00	+1000000+01					41	6
435	850	PC	+0000000+00	+1000000+01					41	6
437	850	PC	+0000000+00	+1000000+01					41	6
438	850	PC	+0000000+00	+1000000+01					41	6
439	850	PC	+0000000+00	+1000000+01					41	6
441	850	PC	+0000000+00	+1000000+01					41	6
442	850	PC	+0000000+00	+1000000+01					41	6
443	850	PC	+0000000+00	+1000000+01					41	6
445	850	PC	+0000000+00	+1000000+01					41	6
447	850	PC	+0000000+00	+1000000+01					41	6
448	850	PC	+0000000+00	+1000000+01					41	6
449	850	PC	+0000000+00	+1000000+01					41	6
451	850	PC	+0000000+00	+1000000+01					41	6
452	850	PC	+0000000+00	+1000000+01					41	6
453	850	PC	+0000000+00	+1000000+01					41	6
455	850	PC	+0000000+00	+1000000+01					41	6
457	850	PC	+0000000+00	+1000000+01					41	6
458	850	PC	+0000000+00	+1000000+01					41	6
459	850	PC	+0000000+00	+1000000+01					41	6
461	850	PC	+0000000+00	+1000000+01					41	6
462	850	PC	+0000000+00	+1000000+01					41	6
463	850	PC	+0000000+00	+1000000+01					41	6
470	850	PC	+0000000+00	+1000000+01					41	6
471	850	PC	+0000000+00	+1000000+01					41	6
472	850	PC	+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 11 of 20)

ENTRY	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
			A0	A1	A2	A3	A4	A5	EXP ID	TABLE
473	850	PC	+0000000+00	+1000000+01					41	6
474	850	PC	+0000000+00	+1000000+01					41	6
475	850	PC	+0000000+00	+1000000+01					41	6
476	850	PC	+0000000+00	+1000000+01					41	6
477	850	PC	+0000000+00	+1000000+01					41	6
478	850	PC	+0000000+00	+1000000+01					41	6
479	850	PC	+0000000+00	+1000000+01					41	6
480	850	PC	+0000000+00	+1000000+01					41	6
481	850	PC	+0000000+00	+1000000+01					41	6
482	850	PC	+0000000+00	+1000000+01					41	6
483	850	PC	+0000000+00	+1000000+01					41	6
484	850	PC	+0000000+00	+1000000+01					41	6
485	850	PC	+0000000+00	+1000000+01					41	6
486	850	PC	+0000000+00	+1000000+01					41	6
487	850	PC	+0000000+00	+1000000+01					41	6
488	850	PC	+0000000+00	+1000000+01					41	6
001	851	PC	+0000000+00	+1000000+01					41	6
002	851	PC	+0000000+00	+1000000+01					41	6
003	851	PC	+0000000+00	+1000000+01					41	6
004	851	PC	+0000000+00	+1000000+01					41	6
005	851	PC	+0000000+00	+1000000+01					41	6
006	851	PC	+0000000+00	+1000000+01					41	6
007	851	PC	+0000000+00	+1000000+01					41	6
008	851	PC	+0000000+00	+1000000+01					41	6
009	851	PC	+0000000+00	+1000000+01					41	6
010	851	PC	+0000000+00	+1000000+01					41	6
011	851	PC	+0000000+00	+1000000+01					41	6
012	851	PC	+0000000+00	+1000000+01					41	6
013	851	PC	+0000000+00	+1000000+01					41	6
014	851	PC	+0000000+00	+1000000+01					41	6
015	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 12 of 20)

ENTRY	NUMBER	CONTROL	NCTAYLIEBRATION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
				A0	A1	A2	A3	A4	A5	EXPID	TABLE
016	851	PC		+0000000+00	+1000000+01					41	6
017	851	PC		+0000000+00	+1000000+01					41	6
018	851	PC		+0000000+00	+1000000+01					41	6
019	851	PC		+0000000+00	+1000000+01					41	6
020	851	PC		+0000000+00	+1000000+01					41	6
021	851	PC		+0000000+00	+1000000+01					41	6
022	851	PC		+0000000+00	+1000000+01					41	6
023	851	PC		+0000000+00	+1000000+01					41	6
024	851	PC		+0000000+00	+1000000+01					41	6
025	851	PC		+0000000+00	+1000000+01					41	6
026	851	PC		+0000000+00	+1000000+01					41	6
027	851	PC		+0000000+00	+1000000+01					41	6
028	851	PC		+0000000+00	+1000000+01					41	6
029	851	PC		+0000000+00	+1000000+01					41	6
030	851	PC		+0000000+00	+1000000+01					41	6
031	851	PC		+0000000+00	+1000000+01					41	6
032	851	PC		+0000000+00	+1000000+01					41	6
033	851	PC		+0000000+00	+1000000+01					41	6
034	851	PC		+0000000+00	+1000000+01					41	6
035	851	PC		+0000000+00	+1000000+01					41	6
036	851	PC		+0000000+00	+1000000+01					41	6
037	851	PC		+0000000+00	+1000000+01					41	6
038	851	PC		+0000000+00	+1000000+01					41	6
039	851	PC		+0000000+00	+1000000+01					41	6
040	851	PC		+0000000+00	+1000000+01					41	6
041	851	PC		+0000000+00	+1000000+01					41	6
042	851	PC		+0000000+00	+1000000+01					41	6
043	851	PC		+0000000+00	+1000000+01					41	6
044	851	PC		+0000000+00	+1000000+01					41	6
045	851	PC		+0000000+00	+1000000+01					41	6
046	851	PC		+0000000+00	+1000000+01					41	6
03	05	07		18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 13 of 20)

ENTRY	NUMBER	CONTROL	NONE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE LABEL
				A0	A1	A2	A3	A4	A5		
047	851	PC		+0000000+00	+1000000+01						41 6
048	851	PC		+0000000+00	+1000000+01						41 6
049	851	PC		+0000000+00	+1000000+01						41 6
050	851	PC		+0000000+00	+1000000+01						41 6
051	851	PC		+0000000+00	+1000000+01						41 6
052	851	PC		+0000000+00	+1000000+01						41 6
053	851	PC		+0000000+00	+1000000+01						41 6
054	851	PC		+0000000+00	+1000000+01						41 6
055	851	PC		+0000000+00	+1000000+01						41 6
056	851	PC		+0000000+00	+1000000+01						41 6
057	851	PC		+0000000+00	+1000000+01						41 6
058	851	PC		+0000000+00	+1000000+01						41 6
059	851	PC		+0000000+00	+1000000+01						41 6
060	851	PC		+0000000+00	+1000000+01						41 6
061	851	PC		+0000000+00	+1000000+01						41 6
062	851	PC		+0000000+00	+1000000+01						41 6
063	851	PC		+0000000+00	+1000000+01						41 6
064	851	PC		+0000000+00	+1000000+01						41 6
065	851	PC		+0000000+00	+1000000+01						41 6
066	851	PC		+0000000+00	+1000000+01						41 6
067	851	PC		+0000000+00	+1000000+01						41 6
068	851	PC		+0000000+00	+1000000+01						41 6
069	851	PC		+0000000+00	+1000000+01						41 6
070	851	PC		+0000000+00	+1000000+01						41 6
071	851	PC		+0000000+00	+1000000+01						41 6
072	851	PC		+0000000+00	+1000000+01						41 6
073	851	PC		+0000000+00	+1000000+01						41 6
074	851	PC		+0000000+00	+1000000+01						41 6
075	851	PC		+0000000+00	+1000000+01						41 6
076	851	PC		+0000000+00	+1000000+01						41 6
077	851	PC		+0000000+00	+1000000+01						41 6

03	05	07	18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 14 of 20)

ENTRY	NUMBER	CONTROL OUTPUT	CONTROL ACTION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
										EXP	TABLE
				A0	A1	A2	A3	A4	A5		
078	851	PC		+0000000+00	+1000000+01					41	6
079	851	PC		+0000000+00	+1000000+01					41	6
080	851	PC		+0000000+00	+1000000+01					41	6
081	851	PC		+0000000+00	+1000000+01					41	6
082	851	PC		+0000000+00	+1000000+01					41	6
083	851	PC		+0000000+00	+1000000+01					41	6
084	851	PC		+0000000+00	+1000000+01					41	6
085	851	PC		+0000000+00	+1000000+01					41	6
086	851	PC		+0000000+00	+1000000+01					41	6
087	851	PC		+0000000+00	+1000000+01					41	6
088	851	PC		+0000000+00	+1000000+01					41	6
089	851	PC		+0000000+00	+1000000+01					41	6
090	851	PC		+0000000+00	+1000000+01					41	6
091	851	PC		+0000000+00	+1000000+01					41	6
092	851	PC		+0000000+00	+1000000+01					41	6
093	851	PC		+0000000+00	+1000000+01					41	6
094	851	PC		+0000000+00	+1000000+01					41	6
095	851	PC		+0000000+00	+1000000+01					41	6
096	851	PC		+0000000+00	+1000000+01					41	6
097	851	PC		+0000000+00	+1000000+01					41	6
098	851	PC		+0000000+00	+1000000+01					41	6
099	851	PC		+0000000+00	+1000000+01					41	6
100	851	PC		+0000000+00	+1000000+01					41	6
101	851	PC		+0000000+00	+1000000+01					41	6
102	851	PC		+0000000+00	+1000000+01					41	6
103	851	PC		+0000000+00	+1000000+01					41	6
104	851	PC		+0000000+00	+1000000+01					41	6
105	851	PC		+0000000+00	+1000000+01					41	6
106	851	PC		+0000000+00	+1000000+01					41	6
107	851	PC		+0000000+00	+1000000+01					41	6
108	851	PC		+0000000+00	+1000000+01					41	6
03	05	07		18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 15 of 20)

ENTRY	NUMBER	CONTROL	NUMBER	CONTACT	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
											EXP	TABLE
					A0	A1	A2	A3	A4	A5		
109	851	PC			+0000000+00	+1000000+01					41	6
110	851	PC			+0000000+00	+1000000+01					41	6
111	851	PC			+0000000+00	+1000000+01					41	6
112	851	PC			+0000000+00	+1000000+01					41	6
113	851	PC			+0000000+00	+1000000+01					41	6
114	851	PC			+0000000+00	+1000000+01					41	6
115	851	PC			+0000000+00	+1000000+01					41	6
116	851	PC			+0000000+00	+1000000+01					41	6
117	851	PC			+0000000+00	+1000000+01					41	6
118	851	PC			+0000000+00	+1000000+01					41	6
119	851	PC			+0000000+00	+1000000+01					41	6
120	851	PC			+0000000+00	+1000000+01					41	6
121	851	PC			+0000000+00	+1000000+01					41	6
122	851	PC			+0000000+00	+1000000+01					41	6
123	851	PC			+0000000+00	+1000000+01					41	6
124	851	PC			+0000000+00	+1000000+01					41	6
125	851	PC			+0000000+00	+1000000+01					41	6
126	851	PC			+0000000+00	+1000000+01					41	6
127	851	PC			+0000000+00	+1000000+01					41	6
128	851	PC			+0000000+00	+1000000+01					41	6
129	851	PC			+0000000+00	+1000000+01					41	6
130	851	PC			+0000000+00	+1000000+01					41	6
131	851	PC			+0000000+00	+1000000+01					41	6
132	851	PC			+0000000+00	+1000000+01					41	6
133	851	PC			+0000000+00	+1000000+01					41	6
134	851	PC			+0000000+00	+1000000+01					41	6
135	851	PC			+0000000+00	+1000000+01					41	6
136	851	PC			+0000000+00	+1000000+01					41	6
137	851	PC			+0000000+00	+1000000+01					41	6
138	851	PC			+0000000+00	+1000000+01					41	6
139	851	PC			+0000000+00	+1000000+01					41	6

0	0	0	1	2	4	5	6	7	7	8
3	5	7	8	9	0	1	2	3	9	0

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 16 of 20)

ENTRY	NUMBER	COMMAND	NOUN	CTAYLP IEBRATION	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						///// EXP	TAB LBB	
					A0	A1	A2	A3	A4	A5			
140	851	PC			+0000000+00	+1000000+01						41	6
141	851	PC			+0000000+00	+1000000+01						41	6
142	851	PC			+0000000+00	+1000000+01						41	6
143	851	PC			+0000000+00	+1000000+01						41	6
144	851	PC			+0000000+00	+1000000+01						41	6
145	851	PC			+0000000+00	+1000000+01						41	6
146	851	PC			+0000000+00	+1000000+01						41	6
147	851	PC			+0000000+00	+1000000+01						41	6
148	851	PC			+0000000+00	+1000000+01						41	6
149	851	PC			+0000000+00	+1000000+01						41	6
150	851	PC			+0000000+00	+1000000+01						41	6
151	851	PC			+0000000+00	+1000000+01						41	6
152	851	PC			+0000000+00	+1000000+01						41	6
153	851	PC			+0000000+00	+1000000+01						41	6
154	851	PC			+0000000+00	+1000000+01						41	6
155	851	PC			+0000000+00	+1000000+01						41	6
156	851	PC			+0000000+00	+1000000+01						41	6
157	851	PC			+0000000+00	+1000000+01						41	6
158	851	PC			+0000000+00	+1000000+01						41	6
159	851	PC			+0000000+00	+1000000+01						41	6
160	851	PC			+0000000+00	+1000000+01						41	6
161	851	PC			+0000000+00	+1000000+01						41	6
162	851	PC			+0000000+00	+1000000+01						41	6
163	851	PC			+0000000+00	+1000000+01						41	6
164	851	PC			+0000000+00	+1000000+01						41	6
165	851	PC			+0000000+00	+1000000+01						41	6
166	851	PC			+0000000+00	+1000000+01						41	6
167	851	PC			+0000000+00	+1000000+01						41	6
168	851	PC			+0000000+00	+1000000+01						41	6
169	851	PC			+0000000+00	+1000000+01						41	6
170	851	PC			+0000000+00	+1000000+01						41	6
03	05	07			18	29	40	51	62	73		79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 17 of 20)

ENTRY	UNIT	CONTROL	CONTROL BYTE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						//// EXP ID	TABLE BLOCK
				A0	A1	A2	A3	A4	A5		
171	851	PC		+0000000+00	+1000000+01						41 6
172	851	PC		+0000000+00	+1000000+01						41 6
173	851	PC		+0000000+00	+1000000+01						41 6
174	851	PC		+0000000+00	+1000000+01						41 6
175	851	PC		+0000000+00	+1000000+01						41 6
176	851	PC		+0000000+00	+1000000+01						41 6
177	851	PC		+0000000+00	+1000000+01						41 6
178	851	PC		+0000000+00	+1000000+01						41 6
179	851	PC		+0000000+00	+1000000+01						41 6
180	851	PC		+0000000+00	+1000000+01						41 6
181	851	PC		+0000000+00	+1000000+01						41 6
182	851	PC		+0000000+00	+1000000+01						41 6
183	851	PC		+0000000+00	+1000000+01						41 6
184	851	PC		+0000000+00	+1000000+01						41 6
185	851	PC		+0000000+00	+1000000+01						41 6
186	851	PC		+0000000+00	+1000000+01						41 6
187	851	PC		+0000000+00	+1000000+01						41 6
188	851	PC		+0000000+00	+1000000+01						41 6
189	851	PC		+0000000+00	+1000000+01						41 6
190	851	PC		+0000000+00	+1000000+01						41 6
191	851	PC		+0000000+00	+1000000+01						41 6
192	851	PC		+0000000+00	+1000000+01						41 6
193	851	PC		+0000000+00	+1000000+01						41 6
194	851	PC		+0000000+00	+1000000+01						41 6
195	851	PC		+0000000+00	+1000000+01						41 6
196	851	PC		+0000000+00	+1000000+01						41 6
197	851	PC		+0000000+00	+1000000+01						41 6
198	851	PC		+0000000+00	+1000000+01						41 6
199	851	PC		+0000000+00	+1000000+01						41 6
200	851	PC		+0000000+00	+1000000+01						41 6
201	851	PC		+0000000+00	+1000000+01						41 6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 18 of 20)

ENTRY	NUMBER	CONTROL BLOCK	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE LIBRARY
			A0	A1	A2	A3	A4	A5		
202	851	PC	+0000000+00	+1000000+01					41	6
203	851	PC	+0000000+00	+1000000+01					41	6
204	851	PC	+0000000+00	+1000000+01					41	6
205	851	PC	+0000000+00	+1000000+01					41	6
206	851	PC	+0000000+00	+1000000+01					41	6
207	851	PC	+0000000+00	+1000000+01					41	6
208	851	PC	+0000000+00	+1000000+01					41	6
209	851	PC	+0000000+00	+1000000+01					41	6
210	851	PC	+0000000+00	+1000000+01					41	6
211	851	PC	+0000000+00	+1000000+01					41	6
212	851	PC	+0000000+00	+1000000+01					41	6
213	851	PC	+0000000+00	+1000000+01					41	6
214	851	PC	+0000000+00	+1000000+01					41	6
215	851	PC	+0000000+00	+1000000+01					41	6
216	851	PC	+0000000+00	+1000000+01					41	6
217	851	PC	+0000000+00	+1000000+01					41	6
218	851	PC	+0000000+00	+1000000+01					41	6
219	851	PC	+0000000+00	+1000000+01					41	6
220	851	PC	+0000000+00	+1000000+01					41	6
221	851	PC	+0000000+00	+1000000+01					41	6
222	851	PC	+0000000+00	+1000000+01					41	6
223	851	PC	+0000000+00	+1000000+01					41	6
224	851	PC	+0000000+00	+1000000+01					41	6
225	851	PC	+0000000+00	+1000000+01					41	6
226	851	PC	+0000000+00	+1000000+01					41	6
227	851	PC	+0000000+00	+1000000+01					41	6
228	851	PC	+0000000+00	+1000000+01					41	6
229	851	PC	+0000000+00	+1000000+01					41	6
230	851	PC	+0000000+00	+1000000+01					41	6
231	851	PC	+0000000+00	+1000000+01					41	6
232	851	PC	+0000000+00	+1000000+01					41	6

03	05	07	18	29	40	51	62	73	79	80

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TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 19 of 20)

ENTRY	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXPONENT	TABLE
			A0	A1	A2	A3	A4	A5		
233	851	PC	+0000000+00	+1000000+01					41	6
234	851	PC	+0000000+00	+1000000+01					41	6
235	851	PC	+0000000+00	+1000000+01					41	6
236	851	PC	+0000000+00	+1000000+01					41	6
237	851	PC	+0000000+00	+1000000+01					41	6
238	851	PC	+0000000+00	+1000000+01					41	6
239	851	PC	+0000000+00	+1000000+01					41	6
240	851	PC	+0000000+00	+1000000+01					41	6
241	851	PC	+0000000+00	+1000000+01					41	6
242	851	PC	+0000000+00	+1000000+01					41	6
243	851	PC	+0000000+00	+1000000+01					41	6
244	851	PC	+0000000+00	+1000000+01					41	6
245	851	PC	+0000000+00	+1000000+01					41	6
246	851	PC	+0000000+00	+1000000+01					41	6
247	851	PC	+0000000+00	+1000000+01					41	6
248	851	PC	+0000000+00	+1000000+01					41	6
249	851	PC	+0000000+00	+1000000+01					41	6
250	851	PC	+0000000+00	+1000000+01					41	6
251	851	PC	+0000000+00	+1000000+01					41	6
252	851	PC	+0000000+00	+1000000+01					41	6
253	851	PC	+0000000+00	+1000000+01					41	6
254	851	PC	+0000000+00	+1000000+01					41	6
255	851	PC	+0000000+00	+1000000+01					41	6
256	851	PC	+0000000+00	+1000000+01					41	6
257	851	PC	+0000000+00	+1000000+01					41	6
258	851	PC	+0000000+00	+1000000+01					41	6
259	851	PC	+0000000+00	+1000000+01					41	6
260	851	PC	+0000000+00	+1000000+01					41	6
261	851	PC	+0000000+00	+1000000+01					41	6
262	851	PC	+0000000+00	+1000000+01					41	6
263	851	PC	+0000000+00	+5000000-01					41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 20 of 20)

ENTRY	NUMBER	CONTROL	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							
			A0	A1	A2	A3	A4	A5	EXPID	TABLE
265	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 1 of 14)

ENTRY NUMBER	CONTROL NUMBER	CONTROL MNEMONIC	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION TYPE	EXCEPTION BUFFER
001	850	EM				0	CDAS FAILURE-BITE #1 (Tbl 1)	OK	FAIL	41	7
002	850	EM				0	CDAS FAILURE-BITE #2 (Tbl 1)	OK	FAIL	41	7
003	850	EM				0	PDS PWR OFF (Tbl 1)	ON	OFF	41	7
004	850	EM				1	PDS PWR OFF (Tbl 1)	OFF	ON	41	7
005	850	EM				0	SCS PWR OFF (Tbl 1)	ON	OFF	41	7
006	850							YES	NO	41	7
006	850	EM				1	SCS PWR OFF (Tbl 1)	OFF	ON	41	7
007	850							NO	YES	41	7
007	850	EM				0	CDAS PWR OFF (Tbl 1)	ON	OFF	41	7
008	850	EM				1	EXTRM TRAVEL LIMIT EXCEEDED	YES	NO	41	7
008	850	EM				1	CDAS PWR OFF (Tbl 1)	OFF	ON	41	7
009	850	EM				0	EXTRM TRAVEL LIMIT EXCEEDED	NO	YES	41	7
010	850							YES	NO	41	7
011	850							NO	YES	41	7
011	850	EM				1	NO AVIONICS AIR-SCS #2 (Tbl	FAIL	OK	41	7
012	850	EM						YES	NO	41	7
012	850	EM				1	NO AVIONICS AIR-PDS #2 (Tbl	FAIL	OK	41	7
013	850							NO	YES	41	7
014	850	EM				1	WATER OUTLET BYPASS	BYPS	NORM	41	7
015	850	EM				0	WATER OUTLET BYPASS	NORM	BYPS	41	7
016	850	EM				1	WATER INLET BYPASS	BYPS	NORM	41	7
017	850	EM				0	WATER INLET BYPASS	NORM	BYPS	41	7
018	850							CLS	OPN	41	7
019	850							OPN	CLS	41	7
020	850							CLS	OPN	41	7
021	850							OPN	CLS	41	7
022	850							YES	NO	41	7
023	850							NO	YES	41	7
024	850							YES	NO	41	7
025	850							NO	YES	41	7
026	850							YES	NO	41	7
027	850							NO	YES	41	7
028	850							NO	YES	41	7

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 2 of 14)

ENTRY	CONNECTOR	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////
ENTRY NUMBER	CONNECTOR NUMBER	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXPANSION BOARD / TERMINAL BOARD / EXPANSION BOARD
029	850						NO	YES	41 7
030	850						YES	NO	41 7
031	850						NO	YES	41 7
032	850						YES	NO	41 7
033	850						NO	YES	41 7
034	850						YES	NO	41 7
035	850						NO	YES	41 7
036	850						YES	NO	41 7
037	850						NO	YES	41 7
038	850						OK	FAIL	41 7
039	850						OK	FAIL	41 7
040	850						OK	FAIL	41 7
041	850						OK	FAIL	41 7
042	850						OK	FAIL	41 7
043	850						OK	FAIL	41 7
044	850						OK	FAIL	41 7
045	850						OK	FAIL	41 7
046	850 EM				1	NO AVIONICS AIR - PDS #1	FAIL	OK	41 7
047	850 EM				1	NO AVIONICS AIR - PCS #1	FAIL	OK	41 7
048	850						ON	OFF	41 7
049	850						OFF	ON	41 7
050	850						ON	OFF	41 7
051	850						OFF	ON	41 7
052	850 EM				1	LO IFEA WATER FLOW #1	FAIL	OK	41 7
053	850 EM				1	NO AVIONICS AIR - SCS #1	FAIL	OK	41 7
054	850						OK	FAIL	41 7
055	850						OK	FAIL	41 7
056	850						OK	FAIL	41 7
057	850						OK	FAIL	41 7
058	850						OK	FAIL	41 7
059	850						OK	FAIL	41 7
060	850						OK	FAIL	41 7
061	850						OK	FAIL	41 7
03 05		12	20	28	36 38		66	72	79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 3 of 14)

ENTRY	CONTROL MOMENTARY OR NEXT STATE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION MONITOR MESSAGE TABLE ENTRY	TABLE ENTRY
062	850						ON	OFF	41	7
063	850						OFF	ON	41	7
064	850						ON	OFF	41	7
065	850						OFF	ON	41	7
066	850						ON	OFF	41	7
067	850						OFF	ON	41	7
068	850						ON	OFF	41	7
069	850						OFF	ON	41	7
070	850						ON	OFF	41	7
071	850						OFF	ON	41	7
072	850						ON	OFF	41	7
073	850						OFF	ON	41	7
074	850						ON	OFF	41	7
075	850						OFF	ON	41	7
076	850						ON	OFF	41	7
077	850						OFF	ON	41	7
078	850						YES	NO	41	7
079	850						NO	YES	41	7
080	850						YES	NO	41	7
081	850						NO	YES	41	7
082	850						YES	NO	41	7
083	850						NO	YES	41	7
084	850						CLS	OPN	41	7
085	850						OPN	CLS	41	7
086	850						ON	OFF	41	7
087	850						OFF	ON	41	7
088	850						ON	OFF	41	7
089	850						OFF	ON	41	7
090	850						ON	OFF	41	7
091	850						OFF	ON	41	7
092	850						ON	OFF	41	7
093	850						OFF	ON	41	7
094	850						ON	OFF	41	7

ENTRY	CONTROL MOMENTARY OR NEXT STATE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION MONITOR MESSAGE TABLE ENTRY	TABLE ENTRY
03	05	12	20	28	36 38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 4 of 14)

ENTRY	CONTROL OR MONITOR	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		////
									////
									--|-|
									E T
									X A
									P B
									I L
									D E
		UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	
095	850						OFF	ON	41 7
096	850 EM				1	LO IFEA WATER FLOW #2	FAIL	OK	41 7
097	850 EM				1	NO AVIONICS AIR - PCS #2	FAIL	OK	41 7
098	850						OK	FAIL	41 7
099	850						OK	FAIL	41 7
100	850						OK	FAIL	41 7
101	850						OK	FAIL	41 7
102	850						OK	FAIL	41 7
103	850						OK	FAIL	41 7
104	850						OK	FAIL	41 7
105	850						OK	FAIL	41 7
106	850 EM				0	PCS UTILITY PWR OFF	ON	OFF	41 7
107	850 EM				1	PCS UTILITY PWR OFF	OFF	ON	41 7
108	850						ON	OFF	41 7
109	850						OFF	ON	41 7
110	850						ON	OFF	41 7
111	850						OFF	ON	41 7
112	850						ON	OFF	41 7
113	850						OFF	ON	41 7
114	850						ON	OFF	41 7
115	850						OFF	ON	41 7
116	850						ON	OFF	41 7
117	850						OFF	ON	41 7
118	850						ON	OFF	41 7
119	850						OFF	ON	41 7
120	850						OFF	ON	41 7
121	850						ON	OFF	41 7
122	850						ON	OFF	41 7
123	850						OFF	ON	41 7
124	850						ON	OFF	41 7
125	850						OFF	ON	41 7
126	850						ON	OFF	41 7
127	850						OFF	ON	41 7
03	05	12	20	28	36 38		66	72	79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 5 of 14)

ENTRY NUMBER	CONTROL BLOCK	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION PROCESSING
128	850							ON	OFF	41 7
129	850							OFF	ON	41 7
130	850							ON	OFF	41 7
131	850							OFF	ON	41 7
132	850							ON	OFF	41 7
133	850							OFF	ON	41 7
134	850							ON	OFF	41 7
135	850							OFF	ON	41 7
136	850							ON	OFF	41 7
137	850							OFF	ON	41 7
186	850							NO	YES	41 7
200	850	EM				1		WAIT	RUN	41 7
212	850	LS	3740		3740		HI EXP MAIN BUS CURRENT			41 7
213	850	LS	3358	2396			EXP MAIN BUS VOLTAGE OOL			41 7
214	850	LS	410		819		HI IFEA LOWER HUMIDITY			41 7
215	850	LS	410		819		HI IFEA UPPER HUMIDITY			41 7
216	850	LS	1911	887	1979	887	IFEA PRESSURE 1 OOL			41 7
217	850	LS	1911	887	1979	887	IFEA PRESSURE 2 OOL			41 7
218	850	LS	1954		2035		HI LOWER ATMOS TEMP			41 7
219	850	LS	1954		2035		HI UPPER ATMOS TEMP			41 7
220	850	LS	504		585		HI IFEA WATER INLET TEMP			41 7
221	850	LS	827		907		HI IFEA WATER OUTLET TEMP			41 7
222	850	LS	827		907		HI CLD END SHELL TEMP			41 7
223	850	LS	827		907		HI HOT END SHELL TEMP			41 7
224	850	LS	827		907		HI RFM WATER OUTLET TEMP			41 7
261	850	LS	2007		2007		HI STEP MTR PHASE A CURRENT			41 7
262	850	LS	2163		2163		HI STEP MTR PHASE A VOLTAGE			41 7
263	850	LS	2007		2007		HI STEP MTR PHASE B CURRENT			41 7
264	850	LS	2163		2163		HI STEP MTR PHASE B VOLTAGE			41 7
266	850	LS	827		1067		HI FTS STEPPER MOTOR TEMP			41 7
268	850	LS	3003		3003		HI COLD GUARD HTR CURRENT			41 7
269	850	LS	1536		1536		HI COLD GUARD HTR VOLTAGE			41 7
270	850	LS	3003		3003		HI COLD PRIM HTR CURRENT			41 7

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 6 of 14)

ENTRY	CONN	OPER	MTBE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION ACTION	TEST
271	850	LS		1536		1536		HI COLD PRIM HTR VOLTAGE			41	7
272	850	LS		3003		3003		HI COLD RED HTR CURRENT			41	7
273	850	LS		1536		1536		HI COLD RED HTR VOLTAGE			41	7
274	850	LS		3003		3003		HI BOOST HTR CURRENT			41	7
275	850	LS		3072		3072		HI BOOST HTR VOLTAGE			41	7
276	850	LS		3003		3003		HI HOT GUARD HTR CURRENT			41	7
277	850	LS		1536		1536		HI HOT GUARD HTR VOLTAGE			41	7
278	850	LS		3003		3003		HI HOT PRIM HTR CURRENT			41	7
279	850	LS		3072		3072		HI HOT PRIM HTR VOLTAGE			41	7
280	850	LS		3003		3003		HI HOT RED HTR CURRENT			41	7
281	850	LS		3072		3072		HI HOT RED HTR VOLTAGE			41	7
282	850	LS		827		907		HI CJ TEMP - COLD ZONE #1			41	7
283	850	LS		827		907		HI CJ TEMP - COLD ZONE #2			41	7
284	850	LS		827		907		HI CJ TEMP - HOT ZONE #1			41	7
285	850	LS		827		907		HI CJ TEMP - HOT ZONE #2			41	7
286	850	LS		827		907		HI CJ TEMP-SAMPLE 1 SENSOR 1			41	7
287	850	LS		827		907		HI CJ TEMP-SAMPLE 1 SENSOR 2			41	7
288	850	LS		827		907		HI CJ TEMP-SAMPLE 2 SENSOR 1			41	7
289	850	LS		827		907		HI CJ TEMP-SAMPLE 2 SENSOR 2			41	7
290	850	LS		827		907		HI CJ TEMP-SAMPLE 3 SENSOR 1			41	7
291	850	LS		827		907		HI CJ TEMP-SAMPLE 3 SENSOR 2			41	7
292	850	LS		827		907		HI CJ TEMP-SAMPLE 4 SENSOR 1			41	7
293	850	LS		827		907		HI CJ TEMP-SAMPLE 4 SENSOR 2			41	7
294	850	LS		827		907		HI CJ TEMP-SAMPLE 5 SENSOR 1			41	7
295	850	LS		827		907		HI CJ TEMP-SAMPLE 5 SENSOR 2			41	7
296	850	LS		827		907		HI CJ TEMP-SAMPLE 6 SENSOR 1			41	7
297	850	LS		827		907		HI CJ TEMP-SAMPLE 6 SENSOR 2			41	7
313	850	LS		987		1227		HI ALIGN ARM TEMP			41	7
314	850	LS		827		907		HI SEM TRACK TEMP			41	7
465	850								NO	YES	41	7
466	850								NO	YES	41	7
467	850								NO	YES	41	7
468	850								NO	YES	41	7

0 3	0 5	1 2	2 0	2 8	3 6	3 8	6 6	7 2	7 9	8 1	8 3

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 7 of 14)

ENTRY	CONTROL NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION DISABLE	TEST ENABLE
469	850							NO	YES	41	7
489	850							OK	FAIL	41	7
490	850							OK	FAIL	41	7
491	850							OK	FAIL	41	7
492	850							OK	FAIL	41	7
493	850							OK	FAIL	41	7
494	850							OK	FAIL	41	7
495	850							OK	FAIL	41	7
496	850							OK	FAIL	41	7
497	850							OK	FAIL	41	7
498	850							OK	FAIL	41	7
499	850							OK	FAIL	41	7
500	850							OK	FAIL	41	7
501	850							OK	FAIL	41	7
502	850							OK	FAIL	41	7
503	850							OK	FAIL	41	7
504	850							OK	FAIL	41	7
505	850							OK	FAIL	41	7
506	850							OK	FAIL	41	7
507	850							OK	FAIL	41	7
508	850							OK	FAIL	41	7
509	850							OK	FAIL	41	7
510	850							OK	FAIL	41	7
511	850							OK	FAIL	41	7
512	850							OK	FAIL	41	7
513	850							OK	FAIL	41	7
514	850							OK	FAIL	41	7
515	850							OK	FAIL	41	7
516	850							OK	FAIL	41	7
517	850							OK	FAIL	41	7
518	850							OK	FAIL	41	7
519	850							OK	FAIL	41	7
520	850							OK	FAIL	41	7
03	05		12	20	28	36 38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 8 of 14)

ENTRY	CONNECTOR	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
ENTRY NUMBER	CONNECTOR NUMBER	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXCEPTION MONITOR BYPASS	TASK LABEL
521	850						OK	FAIL	41	7
522	850						OK	FAIL	41	7
523	850						OK	FAIL	41	7
524	850						OK	FAIL	41	7
525	850						OK	FAIL	41	7
526	850						OK	FAIL	41	7
527	850						OK	FAIL	41	7
528	850						OK	FAIL	41	7
529	850						OK	FAIL	41	7
530	850						OK	FAIL	41	7
531	850						OK	FAIL	41	7
532	850						OK	FAIL	41	7
533	850						OK	FAIL	41	7
534	850						OK	FAIL	41	7
535	850						OK	FAIL	41	7
536	850						OK	FAIL	41	7
537	850						OK	FAIL	41	7
538	850						OK	FAIL	41	7
539	850						OK	FAIL	41	7
540	850						OK	FAIL	41	7
541	850						OK	FAIL	41	7
542	850						OK	FAIL	41	7
543	850						OK	FAIL	41	7
544	850						OK	FAIL	41	7
545	850						OK	FAIL	41	7
546	850						OK	FAIL	41	7
547	850						OK	FAIL	41	7
548	850						OK	FAIL	41	7
549	850						OK	FAIL	41	7
550	850						OK	FAIL	41	7
551	850						OK	FAIL	41	7
552	850						OK	FAIL	41	7
553	850						OK	FAIL	41	7
03	05	12	20	28	36	38	66	72	79	813

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 9 of 14)

ENTRY	CONTROL NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPECTED STATE	TARGET BOARD
554	850							OK	FAIL	41	7
555	850							OK	FAIL	41	7
556	850							OK	FAIL	41	7
557	850							OK	FAIL	41	7
558	850							OK	FAIL	41	7
559	850							OK	FAIL	41	7
560	850							OK	FAIL	41	7
561	850							OK	FAIL	41	7
562	850							OK	FAIL	41	7
563	850							OK	FAIL	41	7
564	850							OK	FAIL	41	7
565	850							OK	FAIL	41	7
566	850							OK	FAIL	41	7
567	850							OK	FAIL	41	7
568	850							OK	FAIL	41	7
569	850							OK	FAIL	41	7
570	850							OK	FAIL	41	7
571	850							OK	FAIL	41	7
572	850							OK	FAIL	41	7
573	850							OK	FAIL	41	7
574	850							OK	FAIL	41	7
575	850							OK	FAIL	41	7
576	850							OK	FAIL	41	7
577	850							OK	FAIL	41	7
578	850							OK	FAIL	41	7
579	850							OK	FAIL	41	7
580	850							OK	FAIL	41	7
581	850							OK	FAIL	41	7
582	850							OK	FAIL	41	7
583	850							OK	FAIL	41	7
584	850							OK	FAIL	41	7
585	850							OK	FAIL	41	7
586	850							OK	FAIL	41	7

ENTRY	CONTROL NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPECTED STATE	TARGET BOARD
03	05	12	20	28	36	38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 10 of 14)

ENTRY NUMBER	CONTROL NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXCEPTION ACTION CODE	TEST A/B LEVEL
587	850							OK	FAIL	41	7
588	850							OK	FAIL	41	7
589	850							OK	FAIL	41	7
590	850							OK	FAIL	41	7
591	850							OK	FAIL	41	7
592	850							OK	FAIL	41	7
593	850							OK	FAIL	41	7
594	850							OK	FAIL	41	7
595	850							OK	FAIL	41	7
596	850							OK	FAIL	41	7
597	850							OK	FAIL	41	7
598	850							OK	FAIL	41	7
599	850							OK	FAIL	41	7
600	850							OK	FAIL	41	7
601	850							OK	FAIL	41	7
602	850							OK	FAIL	41	7
603	850							OK	FAIL	41	7
604	850							OK	FAIL	41	7
605	850							OK	FAIL	41	7
606	850							OK	FAIL	41	7
607	850							OK	FAIL	41	7
608	850							OK	FAIL	41	7
609	850							OK	FAIL	41	7
610	850							OK	FAIL	41	7
611	850							OK	FAIL	41	7
612	850							OK	FAIL	41	7
613	850							OK	FAIL	41	7
614	850							OK	FAIL	41	7
615	850							OK	FAIL	41	7
616	850							OK	FAIL	41	7
617	850							OK	FAIL	41	7
618	850							OK	FAIL	41	7
619	850							OK	FAIL	41	7
03	05	12	20	28	36	38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 11 of 14)

ENTRY	NUMBER	OPERATOR	MNEMONIC	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	///// EXPIRED	///// ABLED
620	850								OK	FAIL	41	7
621	850								OK	FAIL	41	7
622	850								OK	FAIL	41	7
623	850								OK	FAIL	41	7
624	850								OK	FAIL	41	7
625	850								OK	FAIL	41	7
626	850								OK	FAIL	41	7
627	850								OK	FAIL	41	7
628	850								OK	FAIL	41	7
629	850								OK	FAIL	41	7
630	850								OK	FAIL	41	7
631	850								OK	FAIL	41	7
632	850								OK	FAIL	41	7
633	850								OK	FAIL	41	7
634	850								OK	FAIL	41	7
635	850								OK	FAIL	41	7
636	850								OK	FAIL	41	7
637	850								OK	FAIL	41	7
638	850								OK	FAIL	41	7
639	850								OK	FAIL	41	7
640	850								OK	FAIL	41	7
641	850								OK	FAIL	41	7
642	850								OK	FAIL	41	7
643	850								OK	FAIL	41	7
644	850								OK	FAIL	41	7
645	850								OK	FAIL	41	7
646	850								OK	FAIL	41	7
647	850								OK	FAIL	41	7
648	850								OK	FAIL	41	7
649	850								OK	FAIL	41	7
650	850								OK	FAIL	41	7
651	850								OK	FAIL	41	7
652	850								OK	FAIL	41	7
03	05			12	20	28	36 38	66	72	79	81	83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 12 of 14)

ENTRY	CONTROL BIT	NOMT/IE/TOR	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXT BIT	//////
653	850							OK	FAIL	41	7
654	850							OK	FAIL	41	7
655	850							OK	FAIL	41	7
656	850							OK	FAIL	41	7
657	850							OK	FAIL	41	7
658	850							OK	FAIL	41	7
659	850							OK	FAIL	41	7
660	850							OK	FAIL	41	7
661	850							OK	FAIL	41	7
662	850							OK	FAIL	41	7
663	850							OK	FAIL	41	7
664	850							OK	FAIL	41	7
665	850							OK	FAIL	41	7
666	850							OK	FAIL	41	7
667	850							OK	FAIL	41	7
668	850							OK	FAIL	41	7
669	850							OK	FAIL	41	7
670	850							OK	FAIL	41	7
671	850							OK	FAIL	41	7
672	850							OK	FAIL	41	7
673	850							OK	FAIL	41	7
674	850							OK	FAIL	41	7
675	850							OK	FAIL	41	7
676	850							OK	FAIL	41	7
677	850							OK	FAIL	41	7
678	850							OK	FAIL	41	7
679	850							OK	FAIL	41	7
680	850							OK	FAIL	41	7
681	850							OK	FAIL	41	7
682	850							OK	FAIL	41	7
683	850							OK	FAIL	41	7
684	850							OK	FAIL	41	7
685	850							OK	FAIL	41	7
03	05	12	20	28	36	38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 13 of 14)

ENTRY	CONTROL NUMBER	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////
		UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXP DATA
686	850						OK	FAIL	41 7
687	850						OK	FAIL	41 7
688	850						OK	FAIL	41 7
689	850						OK	FAIL	41 7
690	850						OK	FAIL	41 7
691	850						OK	FAIL	41 7
692	850						OK	FAIL	41 7
693	850						OK	FAIL	41 7
694	850						OK	FAIL	41 7
695	850						OK	FAIL	41 7
696	850						OK	FAIL	41 7
697	850						OK	FAIL	41 7
698	850						OK	FAIL	41 7
699	850						OK	FAIL	41 7
700	850						OK	FAIL	41 7
701	850						OK	FAIL	41 7
702	850						OK	FAIL	41 7
703	850						OK	FAIL	41 7
704	850						OK	FAIL	41 7
705	850						OK	FAIL	41 7
706	850						OK	FAIL	41 7
707	850						OK	FAIL	41 7
708	850						OK	FAIL	41 7
709	850						OK	FAIL	41 7
710	850						OK	FAIL	41 7
711	850						OK	FAIL	41 7
712	850						OK	FAIL	41 7
713	850						OK	FAIL	41 7
714	850						OK	FAIL	41 7
715	850						OK	FAIL	41 7
716	850						OK	FAIL	41 7
717	850						OK	FAIL	41 7
718	850						OK	FAIL	41 7

03	05	12	20	28	36 38	66	72	79	81	83

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TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 14 of 14)

ENTRY	CONTROL BIT	NOMINAL OPERATING RANGE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
			UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXCEPTION	ALARM
719	850							OK	FAIL	41	7
720	850							OK	FAIL	41	7
721	850							OK	FAIL	41	7
722	850							OK	FAIL	41	7
723	850							OK	FAIL	41	7
724	850							OK	FAIL	41	7
725	850							OK	FAIL	41	7
726	850							OK	FAIL	41	7
727	850							OK	FAIL	41	7
728	850							OK	FAIL	41	7
729	850							OK	FAIL	41	7
730	850							OK	FAIL	41	7
731	850							OK	FAIL	41	7
732	850							OK	FAIL	41	7
733	850							OK	FAIL	41	7
734	850							OK	FAIL	41	7
735	850							OK	FAIL	41	7
736	850							OK	FAIL	41	7
737	850							OK	FAIL	41	7
738	850							OK	FAIL	41	7
739	850							OK	FAIL	41	7
740	850							OK	FAIL	41	7
741	850							OK	FAIL	41	7
742	850							OK	FAIL	41	7
743	850							OK	FAIL	41	7
744	850							OK	FAIL	41	7
745	850							OK	FAIL	41	7
746	850							OK	FAIL	41	7
747	850							OK	FAIL	41	7
748	850							OK	FAIL	41	7
749	850							OK	FAIL	41	7
750	850							OK	FAIL	41	7
264	851							RUN	WAIT	42	7
266	851							NO	YES	42	7
03	05		12	20	28	36	38	66	72	79	81	83

2.8. FLIGHT SOFTWARE REQUIREMENTS

This section of the Experiment/Facility Requirements Document (E/FRD) defines the Space Station Furnace Facility (SSFF) Data Management System (DMS) software functions required to support the Furnace Module-1. Furnace Module-1 will require the SSFF Furnace Control Unit (FCU) and Furnace Actuator Unit (FAU) software to provide networking, data processing, storage and data acquisition and control for Furnace Module-1. The following subsections define the required resources and data handling requirements of Furnace Module-1.

2.8.1 COMMAND SUPPORT

The SSFF software will support the issuance of commands by the Furnace Module-1 application software or commands issued by Tier 1 or the SSFF Core Control Unit (CCU).

2.8.2 DATA ACQUISITION

The SSFF software will support the acquisition of the Furnace Module-1 data defined in Section 2.7 of this E/FRD.

2.8.3 DATA PROCESSING

The SSFF software shall support limited processing of Furnace Module-1 data defined in Section 2.7 of this E/FRD.

2.8.4 DATA ROUTING/FORMATTING

The SSFF software shall support formatting and routing of Furnace Module-1 data, defined in Section 2.7 of this E/FRD, to the SSFF CCU.

2.8.5 DOWNLOADING APPLICATION SOFTWARE AND DATA

The SSFF software shall support downloading of Furnace Module-1 application software and data.

2.8.6 DOWNLOADING ANCILLARY DATA

The SSFF software shall support the retrieval and downloading of ancillary data to the Furnace Module-1 application software.

2.8.7 FDIR SUPPORT

The SSFF software shall provide fault detection, isolation, and recovery (FDIR) support for Furnace Module-1.

2.8.8 OPERATING SYSTEM SERVICES

The SSFF software shall provide operating system services for the Furnace Module-1 application software.

2.8.9 HEALTH AND STATUS DATA

The SSFF shall acquire health and status data from the Furnace Module-1 application software for SSFF storage or transfer to the SSF.

2.9. PHYSICAL INTEGRATION

This section describes the Furnace Module-1 integration/deintegration requirements and flow. Figure 2.9-1 illustrates the Furnace Module-1 physical integration activity flow from the beginning of prelaunch site activities, through deintegration after return from space.

Table 2.9-1 provides the integration facility requirements for each stage of integration. Table 2.9-2 describes the requirements and activities at each step of the integration process.

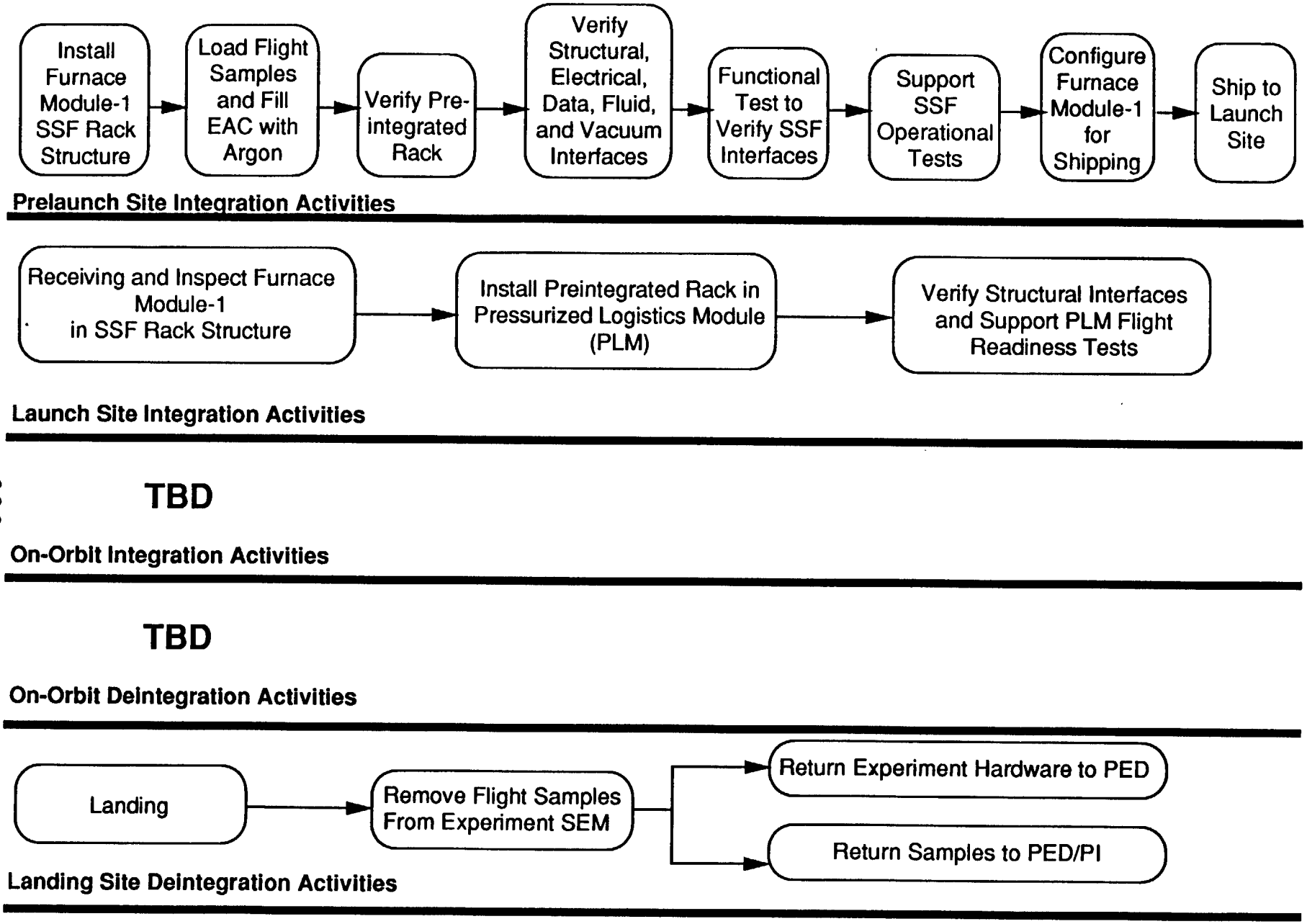


FIGURE 2.9-1. PHYSICAL INTEGRATION FLOW

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TABLE 2.9-1. FURNACE MODULE-1 GROUND PROCESSING REQUIREMENTS
(Sheet 1 of 2)

(√) **Experiment/Facility Preintegration**
( ) **Experiment/Facility Preparation**
( ) **Postmission Requirements**

Description of Planned Activities:

Functional tests, sample loading, and closeout will be performed after the EAC is mounted on the rotation fixture.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: √ Yes _____ No **Hook Height** 8 ft

Facility Power Required:
√ 120 V, 1 F, 60 Hz
√ 208 V, 3 F, 60 Hz
√ Other 220 V, Single Phase, 60 Hz

Other Facility Support: **Gases**
√ GN_2
√ GHe
Argon Other

Liquids Water
_____
_____

Environment: √ Standard _____ Other

Hazardous Operations: _____ Yes √ No

Total Anticipated Use Time: 21 Days

Other Facility Support Description:

Mass spectrometer leak test

TABLE 2.9-1. FURNACE MODULE-1 GROUND PROCESSING REQUIREMENTS
(Sheet 2 of 2)

(√) **Experiment/Facility Preintegration**
( ) **Experiment/Facility Preparation**
( ) **Postmission Requirements**

Description of Planned Activities:

Functional tests, sample loading, and closeout will be performed after the EAC is mounted on the rotation fixture.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: √ Yes _____ No **Hook Height** 8 ft

Facility Power Required
√ 120 V, 1 F, 60 Hz
___ 208 V, 3 F, 60 Hz
___ Other 220 V, Single Phase, 60 Hz

Other Facility Support: **Gases**
_____ GN_2
_____ GHe
_____ Other

Liquids Water
_____
_____

Environment √ Standard _____ Other

Hazardous Operations: _____ Yes √ No

Total Anticipated Use Time: 3 Days

Other Facility Support Description:

Mass spectrometer leak test

TABLE 2.9-2. FURNACE MODULE-1 INTEGRATION REQUIREMENTS

Description of Special Alignment, Calibration, Servicing, or Performance Verification and Estimated Time to Perform:

TBD

Identification of Any Constraints on Experiment/Facility Operations During Tests:

TBD

Description of Time-Critical Operations and Time Constraints:

TBD

2.10. OPERATIONS SUPPORT

Table 2.10-1 describes the physical and operational support required at the Ground Science Operations Control Center, during flight of the Space Station Furnace Facility (SSFF). Specifically, this facility has been designated as the Payload Operations and Integration Center (POIC) by the Space Station Freedom (SSF) Program.

TABLE 2.10-1. FURNACE MODULE-1 MISSION OPERATIONS SUPPORT

COMMUNICATIONS REQUIREMENTS:

Downlink Data

Three terminals

Uplink Commands/data

Three terminals

Voice Communications

Access for three

Video

Real-time and recorded

SUPPORT EQUIPMENT:

Description

Dimensions

Power Requirements

Data Interface

REMOTE SITE INTERFACE

Location

Off-line room for three scientists with access to monitor voice, video, and data.

Describe interfaces

2.11. TRAINING OBJECTIVES

Presently, the training objectives are TO BE SUPPLIED. The following is a detailed generic explanation of the Integrated Requirements on Payloads (IROP) requirements.

Training required for a successful mission begins with the Principal Investigator (PI)/Payload Element Developer (PED) team identifying the training objectives for each task of the experiment. This section shall identify and describe training objectives, trainees, and instructors necessary for experiment operation. This section shall also identify the hardware and software trainers required to support flight-like training.

There are three categories of personnel who will require training to support the mission. Training objectives will be required for each category. These categories are:

- Crew
- POIC cadre
- PI/PED team

Table 2.11-1 identifies the major training objectives, the trainees, and the organizations responsible for developing and conducting required mission payload training. The Furnace Module-1 PED may develop and conduct the training or identify training to be provided by the Core facility PED and/or POIC training function.

The PI/PED team and the Payload Increment Manager (PIM) shall jointly define the training objectives for training at NASA facilities and for integrated training with other mission experiments.

The PIM shall define the increment-independent training objectives for the POIC cadre and will define the increment-independent training objectives for the crew and PI/PED team for training conducted at Marshall Space Flight Center (MSFC).

The PI/PED and PIM shall provide information detailing training objectives for each operational task. The requirements for a trainer and its fidelity shall also be specified. MSFC POIC will develop increment training requirements based on inputs from each payload flown on a specific increment.

2.11.1 PI/PED-DEFINED TRAINING

The Furnace Module-1 (FM-1) PI/PED shall define the training objectives necessary for the crew to understand the required science to operate the furnace module to obtain science data. The FM-1 PI/PED shall also define training objectives required for the POIC cadre and the PIM support of experiment operations. The FM-1 PI/PED will specify the training equipment such as flight-like hardware or trainers required to support the training objectives. Table 2.11-2 will identify the equipment to be supplied by the PI/PED and the equipment requested to be furnished by the SSFP.

TABLE 2.11-1. TRAINING PARTICIPATION

Training Objectives	Trainee	Instructor
PI/PED defined		
Science Background/ Experiment Objectives	Crew Cadre	SSFF PI/PED
FM-1 Systems Familiarization	Crew Cadre	FM-1 PED
FM-1 Operations	Crew Cadre	FM-1 PED
PIM and PI/PED Jointly Defined		
Experiment Proficiency Training	Crew Cadre*	PI/PED, PTC
Integrated Training	Crew Cadre*	PI/PED, PTC
Simulations	Crew Cadre	PI/PED, PTC
PIM Defined		
Increment Independent	Crew Cadre	POIC
POIC Facility Training	Cadre	PI/PED, POIC

* Limited cadre participation

TABLE 2.11-2. FURNACE MODULE-1 TRAINING OBJECTIVES

TRAINING OBJECTIVE		TRAINEE	LEVEL	RESPONSIBLIITY	SIMULATOR REQUIRED				COMMENTS
NO.	DESCRIPTION				YES/ NO	H/W FIDELITY	S/W Y/N	PROVIDER	
1.0	**SCIENCE BACKGROUND**	Crew, cadre	c/a	FM-1 PI/PED	NO				Classroom Instruction
1.1	FM-1 Science Basis and Significance	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.2	FM-1 Science Objectives	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.3	FM-1 Science Theory	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.4	FM-1 Experiment Operations Philosophy	Crew, cadre	c/a	FM-1 PI/PED	NO				
2.0	**FM-1 SYSTEMS FAMILIARIZATION**								
2.1	Hardware	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	
2.1.1	Rack location								
2.1.2	Instrument Components								
2.1.3	Stowage locations								
2.1.4	FM-1 Command & Display								
2.1.5	DMS Interfaces								
2.2	Software	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	
2.2.1	DMS								
2.2.2	Displays								
2.2.3	Command Capabilities Keyboard/MPAC/uplink								
2.2.4	Timeline requirements								
2.3	Data Collection	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	
2.3.1	Onboard								
2.3.2	Downlink								

The PI/PED shall supply objectives for training in the following areas. Other areas may also be included.

- Science Background and Experiment Objectives - Basis and significance of experiment, relationship to precursor experiments, specific objectives of experiment.
- Experiment Systems Familiarization (hardware and software) - Hardware and software elements [both on-orbit and ground support equipment (GSE)] that constitute the experiment system.
- Experiment Operations (nominal, malfunction, in-flight maintenance) - Hands-on training using breadboards, simulators, or flight hardware/software.

The knowledge and skill level for each operational task shall be identified. Tables 2.11-3 and 2.11-4 provide a means of coding the level of proficiency to which the student should be trained in order to accomplish the task. The information will also be used in developing course materials and training equipment.

2.11.2 PIM AND PI/PED JOINTLY DEFINED TRAINING

The PIM and the PI/PED team will jointly define the following training objectives:

- Experiment Proficiency Training - Repetitive exercise of specific experiment operations to develop and maintain operational skills at a flight readiness level.
- Integrated Training - Repetitive exercise of selected portions of the integrated timeline conducted within a simulated mission operations environment and with onboard crew operations as its focus.
- Simulations - Exercise of major portions of the integrated timeline conducted at the highest level of fidelity. Includes all payload elements and may include element of the SSF operations. Exercise crew, POIC cadre, PI/PED team, and SSF operations teams in nominal and contingency operations with emphasis on developing specific skills, strategies, and interactions.

Table 2.11-2 shall be completed using inputs provided by the PIM and PI/PED team. This information is normally obtained from the Increment Training Assessment Team (TAT). The TAT is composed of representatives from POIC, PIM, and PI/PED team who gather, review, and assess mission training needs. The TAT reviews mission documentation and obtains experiment operations and interface requirements for the PIs and from design reviews. It reviews available training equipment and assess the need for development of trainers by the PI/PED team or NASA to accomplish training objectives.

Experiment/PTC/POIC operational training interface needs such as data flow, power and thermal requirements, trainer control and display, and experiment GSE shall be identified in this paragraph.

TABLE 2.11-3. KNOWLEDGE LEVELS

CODE	TRAINEE WILL BE ABLE TO:
a	Recall nomenclature, simple facts, or simple procedures involved in the task or operation.
b	Determine step-by-step procedures for sets of tasks or operations or for accomplishing important decisions.
c	Explain why and when each task or operation must be done.
d	Predict, identify, and solve problems related to the task or operation.

TABLE 2.11-4. SKILL PROFICIENCY LEVELS

CODE	TRAINEE WILL BE ABLE TO:
1	Accomplish most task activities only by being told or shown how.
2	Accomplish most of the behaviors in task or activity, but not necessarily to desired levels of speed or accuracy.
3	Accomplish behaviors in a task or activity at minimum acceptable levels of speed or accuracy.
4	Accomplish all behaviors in an activity at highest levels of speed or accuracy and be able to tell or show others how to do the activities.

Note: This is not a design requirement, but an instrument to document training objectives that present an early need for training equipment and interfaces with the training facility.

2.11.3 PIM-DEFINED TRAINING

The PIM will define the following training objectives:

- Increment-Independent Training - Includes training on SSF and payload support systems and subsystems that remain relatively constant from increment to increment. Examples are Data Management System (DMS), SSF overview, SSF Caution and Warning System, etc.

- POIC Facility Training - Classroom and hands-on opportunities for training on specific POIC facilities such as Operations Management Information System (OMIS), communications protocols, and generic POIC procedures.

2.11.3.1 Increment-Independent Training - Crew

The increment-independent training for the crew on SSF systems and procedures shall be defined by Johnson Space Center (JSC) in JSC training documents and shall be provided at JSC/Kennedy Space Center (KSC).

Increment-independent training for the crew to support payload operations shall be defined by the PIM and provided at Marshall Space Flight Center (MSFC).

The training objectives, trainee responsibility, and any required training equipment shall be listed in Table 2.11-2.

2.11.3.2 Increment-Independent Training - PI/PED Team

The increment-independent training required for the PI/PED team to support the increment at MSFC is defined in this E/FRD. Trainee responsibility and required training equipment shall be listed in Table 2.11-2.

2.11.3.3 Increment-Independent Training - POIC Cadre

The increment-independent training required for the POIC cadre to support the increment is defined in the MSFC Increment-Independent Training Plan.

2.11.4 TRAINING SIMULATION

Experiment trainers will be developed by the PI/PED based upon analysis of training objectives, available training tools, existing trainers, and availability of training opportunities on flight hardware.

The FM-1 PI/PED shall participate in trainer development by identifying training needs in this document. The PI/PED shall provide detailed data inputs to the TAT and Payload Training

Requirement Document (PTRD) and shall participate in Payload Trainer design acceptance reviews.

Training objectives that require a trainer to accomplish the training task shall be listed in this paragraph outlining the overall desired capabilities.

Examples:

Joystick Operation - Capable of interaction with control panel and trainer software.

Scene Generation - Capable of tracking any predefined target.

2.11.5 TRAINING PARTICIPATION

The PI/PED shall participate as instructor or trainee in formal training programs as outlined in Tables 2.11-1, 2.11-2, 2.11-3 and 2.11-4. Schedules and detailed objectives will be developed and maintained in the User Payload Training Plan (UPTP).

2.12. ENVIRONMENTAL CONTAMINATION DATA REQUIREMENTS

Tables 2.12-1, 2.12-2, and 2.12-3 define the environmental contamination requirements for Furnace Module-1.

TABLE 2.12-1. FLIGHT ENVIRONMENTAL LIMITS

	SENSITIVITY LIMIT				EXPERIMENT GENERATED			
	OPERATING		NONOPERATING		OPERATING		NONOPERATING	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
CONTAMINATION MODULE ITEMS	N/A	N/A	N/A	N/A	0	0	0	0
A. PARTICULATE SIZE (μm), number/m^3	N/A	N/A	N/A	N/A	0	0	0	0
B. TRACE GASES (type & ppm)	N/A	N/A	N/A	N/A	-	-	-	-
PRESSURE (N/m^2)								

TABLE 2.12-2. EXTERNAL CONTAMINATION SOURCES

Does experiment/facility release (vent, purge) any material overboard on orbit?

Yes √ **No** ____

PARAMETER	DESCRIPTION
FOs of Occurrence	ALL
Frequency	TBD
Duration	TBD
Composition	Argon, Nitrogen, Air
Phase State (solid, liquid, or gas)	Gas
Quantity or Rate of Release	7 to 37 lbm*

* Maximum, assumes active pressure control for four samples and one manual sample exchange.

TABLE 2.12-3. ON-ORBIT EXTERNAL CONTAMINATION CONTROL SENSITIVITY

To understand and satisfy the on-orbit external contamination limits required by this experiment, please answer the following questions:

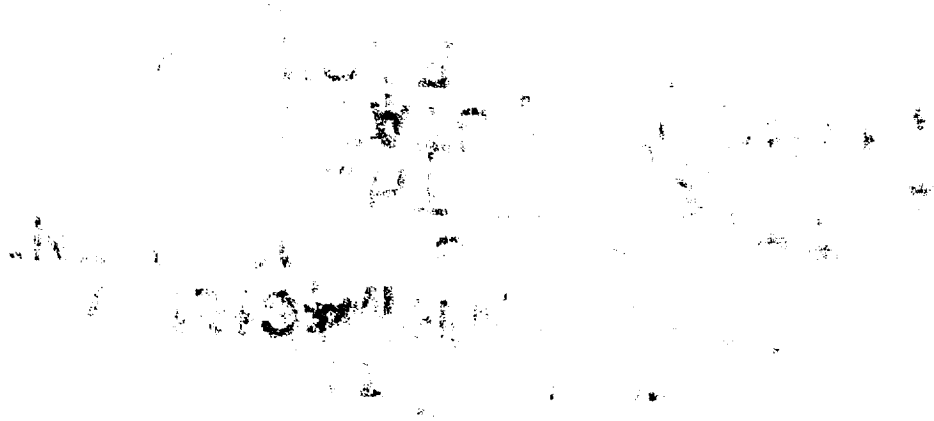
1. Is the equipment subject to corona? Yes☐ No☒

2. Are the experiment data affected by deposition of contaminants on sensitive surfaces? Yes☐ No☒

   - If yes, then answer the following:
     - Is the concern for deposition from particles, film/molecular, or both?
     - What is the FOV for receiving deposition from return flux?
     - What is the surface temperature of the sensitive element?
     - What are the limits of deposition in terms of experiment effects (e.g., 10% degradation at 1400 Å)?
     - List the FOs where deposition is a concern.
     - Is a controllable cover provided for non-data-collecting periods?

3. Is the experiment affected by induced contamination, such as water, CO_2, etc., in the FOV of the sensor? Yes☐ No☒

   - If yes, then answer the following:
     - Is the concern for particles, molecular, or both?
     - Breifly explain the allowable effects on the experiment; qualify the limits if possible (e.g., 10% modification of ambient environment composition; or 10% degradation of 1400 Å waveband; or allowable molecules/cm^2 column density).
     - List the FOs where induced contamination is a concern.



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ABSTRACT = The function of the Space Station Furnace Facilit
y (SSFF) is to support materials research into the
crystal growth and solidification processes of el
ectronic and photonic materials, metals and alloys
, and glasses and ceramics. To support this broad
base of research requirements, the SSFF will emplo
y a variety of furnace modules operated, regulated
, and supported by a core of common subsystems. Fu
rnace modules may be reconfigured or specifically
developed to provide unique solidifcation conditio
ns for each set of experiments. The SSFF modular a
pproach permits the addition of new or scaled-up f
urnace modules to support the evolution of the fac
ility as new science requirements are identified.
The SSFF Core is of modular design to permit augme
ntation for enhanced capabilities. The fully integ
rated configuration of the SSFF will consist of th
ree racks with the capability of supporting up to
two furnace modules per rack. The initial configur
ation of the SSFF will consist of two of the three
racks and one furnace module. This Experiment/Fac
ility Requirements Document (E/FRD) describes the
integrated facility requirements for the Space Sta
tion Freedom (SSF) Integrated Configuration-1 (IC1
). The IC1 SSFF will consist of two racks:
ntralized subsystem equ

ipment, and the Experiment Rack-1, with Furnace Module-1 and the distributed subsystem equipment to support the furnace.

********** END OF ADABAS RECORD # 157541 **********